1923 REVISION
A POINT SCALE FOR MEASURING MENTAL ABILITY

ROBERT M. YERKES
AND
JOSEPHINE E. FOSTER

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A POINT SCALE FOR MEASURING MENTAL ABILITY

1923 Revision

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1923 Revision

BY

ROBERT M. YERKES

National Research Council

AND

JOSEPHINE CURTIS FOSTER

The original edition of this book was written by
ROBERT M. YERKES, JAMES W. BRIDGES AND ROSE S. HARDWICK

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To the memory of

ALFRED BINET

AND

EDMUND B. HUEY

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PREFATORY STATEMENTS AND ACKNOWLEDGMENTS (FIRST EDITION)

In the fall of 1913 the writer proposed to Mr. J. W. Bridges the task of aiding him in constructing a measuring scale for intellectual ability which should consist of a single series of tests and in connection with which credit should be given according to the merit of the subject's response. The suggestion for this type of scale was taken from the work of the late Doctor E. B. Huey. The writer's proposal was forced by the conviction that the Binet age-scale, with its several groups of measurements and its "all-or-none" method of giving credit, was yielding less satisfactory information than the interests of the Psychopathic Hospital demanded. From the first it was our intention to develop a better method rather than to attempt to modify the Binet Scale. Our interest was wholly constructive, and we have been critically destructive only in so far as progress seemed to demand destruction. This is still our attitude toward the older scale, in spite of the fact that we now are fully convinced that it has served its most important purpose and must shortly give way wholly to a superior method.[1]

In the scale which we devised we gave preference to the Binet tests because they had been thoroughly tried out and could be more readily evaluated than could new mate-

[1] The following papers on the Point Scale, parts of which reappear in this volume in modified form, have been published:

Yerkes, Robert M., and Bridges, J. W. The Point Scale: a new method for measuring mental ability. *Boston Medical and Surgical Journal*, 1914, vol. 171, pp. 857–865.

Yerkes, Robert M., and Anderson, Helen M. The importance of social status as indicated by the results of the point scale method of measuring mental capacity. *Jour. Educ. Psy.*, 1915, vol. 6, pp. 137–150.

rials. It was our intention to determine the value of the single-series and the partial-credit ideas before attempting to develop a highly satisfactory form of point scale. We deemed it wiser to content ourselves at the start with a pre-adolescent scale than to attempt to construct one which should be equally applicable to all ages. But very early in our work the idea of a universally applicable scale presented itself, and for a time we were strongly tempted to strive to achieve this ideal immediately instead of working toward it gradually.

The Point Scale, for which results are now to be presented, was avowedly a tentative and provisional group of tests. It was ready for use early in 1914, and now, approximately a year later, we see clearly the possibility of abandoning it in favor of an obviously better scale. Immediately upon the completion of the preliminary preparations a staff of examiners was organized and systematic examining was undertaken in the public schools of Cambridge, Massachusetts, as well as in the Psychopathic Hospital.

Our hearty thanks and sincere gratitude for their open-minded and generous co-operation are due to the school authorities of Cambridge, and especially to the Superintendent, Mr. M. E. Fitzgerald, and to Mr. H. Warren Foss. Without the opportunity to apply our methods to a reasonably large group of normal children we should have been helpless, for the Point Scale's value depends wholly upon reliable norms.

Between January and June, 1914, upward of seven hundred pupils were examined in one grammar school and about sixty in another. The first school included pupils from the kindergarten to the eighth grade; in the second school examinations were made only in the kindergarten and the first grade. While the public school examinations were in progress psychopathic and defective individuals were being examined daily at the Hospital. The number of such subjects to be reported on is about one hundred and fifty. During the summer of 1914 the Scale

was also applied to about seventy-five normal adults ranging in age from seventeen to forty-three years. The statements which are to be made in this book will therefore be based upon approximately one thousand examinations, although, because of various demands of classification, we have been forced to restrict several of our groups, and somewhat less than one thousand individuals appear regularly in the tables of our report.

Approximately four-fifths of the examinations to be reported were made by five experienced examiners: Mr. J. W. Bridges, Mr. R. M. Yerkes, Miss Kate F. Puffer, Miss Rose S. Hardwick and Mr. L. D. Pedrick. The names are arranged in the order of frequency of the examinations. Substantial help was given also by Mr. J. L. Manahan, Mr. H. B. Dine, Miss H. M. Anderson, Miss O. E. Martin, Mr. J. A. Bell, Mr. D. G. Nutter, Miss J. C. Perry, Mr. G. S. Goodwin, and Mr. W. F. Dearborn.

The writers of this report wish to express their appreciation of the aid in the task of establishing norms for the Point Scale so generously and effectively given by the persons named above. Their interest and assistance greatly encouraged those of us upon whom the burden of labor and responsibility rested most heavily.

To the State Board of Insanity of Massachusetts we are indebted for the financial assistance which enabled us to arrange for the clerical and stenographic work entailed by the preparation of our data for publication.

We offer this report as a contribution to method of mental examining. It has been beyond our purpose to discuss similar attempts at the development of measuring scales or to compare our results with those of other observers,—therefore our evident neglect of the literature. Our debt to the writings of Thorndike, Whipple, and Stern, as well as to those of Binet and Huey, is obvious, and we gladly make acknowledgment. Recently many of the objections to the Binet-Simon Scale which prompted our effort to develop a new method have found expression

in the psychological literature of at least three countries.[1] Naturally enough, we are encouraged by this evidence of widespread appreciation of the need for a more satisfactory method of estimating mental ability.

Our scale is in no sense a finished product. It was originally developed as a pre-adolescent scale, with the expectation that, should it prove valuable, a second scale would be developed for use with adolescents and adults. We have, as this volume will make clear, found reason to change our plan and to attempt the development of a universally applicable scale which shall replace both our preliminary pre-adolescent and our proposed post-adolescent scales. The original scale has proved useful to us, and we firmly believe that, in the revised form in which we recommend it for application, it will prove increasingly serviceable to all who employ it. It is our earnest hope that the method may prove to be an important step forward.

Robert M. Yerkes.

Cambridge, Massachusetts, December 18, 1914.

[1] See, for instance, Stern, W. The psychological methods of testing intelligence. Baltimore, 1914.

Burt, Cyril. The measurement of intelligence by the Binet tests. *Eugenics Review*, 1914, vol. 6, nos. 1 and 2.

Berry, C. S. Some limitations of the Binet-Simon tests of intelligence. *Trans. Fourth Intern. Congress on School Hygiene*, Buffalo, August, 1913.

INTRODUCTION TO REVISED EDITION

When in 1917 the World War interrupted constructive psychological work at the Boston Psychopathic Hospital, two point scales supplementary to the original Pre-adolescent Scale were in process of construction. One was to extend the applicability of the point scale method to adolescents and adults and the other to children under seven years of age. It was intended to approach the construction of a universal point scale by perfecting three limited-range scales. Primarily responsible for the construction of the original Point Scale were Messrs. Yerkes and Bridges and Miss Hardwick; for the Adolescent-adult Scale, Messrs. Yerkes and Rossy; and for the Infant Scale (more properly Child Scale), Miss Josephine Curtis.

The immediate cause for the preparation of this revision of the Point Scale book is the exhaustion of the original edition and the decision of the publishers to re-set the book as first written or as revised. In spite of the relative incompleteness of the two new scales it has been decided to present them with such results as have been obtained. Any one of the three scales may be used to advantage by an experienced examiner who is willing to take advantage of indications for improvement and either to establish new norms or to use critically those offered in the present volume.

Since the authors of the first edition were otherwise engaged and had given little attention to methodological work on the Point Scale since 1917, it was arranged that Mrs. Josephine Curtis Foster should take major responsibility for the task of revising, and in effect re-writing, the book.

In order to make room for new materials without overmuch extending the volume, those chapters of the first

edition which present the history of the method, its initial form, and the results upon which the Pre-adolescent Point Scale was based, are omitted. The Pre-adolescent Scale is presented essentially as in the first edition, but in the directions for administration slight changes have been made as indicated by experience, and there have been added for the convenience of examiners many illustrative responses. But even more important than these modifications are the summary reports of results and the new and revised norms or standards of comparison which it is now possible to offer. They should greatly increase the usefulness of the point scale method and the reliability of its results.

Although the greater part of the volume is devoted to the Pre-adolescent Point Scale, the two supplementary scales—adult and infant—are fully described, and thus made available to examiners who may desire to use them.

Special attention is given to the value of the point scale method in the examination of abnormal subjects. It has been definitely established that the method has superior value in hospitals for the mentally deranged and special institutions for defectives and delinquents.

The authors gratefully acknowledge their obligations to Doctors Bird T. Baldwin, John E. Anderson, and H. Egerton Brown for permission to use results of point scale examination; to Miss Lucy Dewey for compilation of point scale bibliography, and to the Boston Medical and Surgical Journal, the Journal of Applied Psychology, and the Journal of Abnormal Psychology for permission to reprint materials.

The Authors.

Washington, D. C., May 11, 1923.

CHAPTER 1

GENERAL DESCRIPTION OF THE POINT SCALE METHOD AND COMPARISON WITH THE BINET SCALES

The Point Scale is an intelligence examination on the principle of a scale of tests graduated by credit points. It is intended for use with subjects over a range of mental ages from 3 to approximately 16. Its accuracy and reliability are greatest between the ages of 6 and 12. The results of the examination are expressed in total scores ranging between 0 and 100. Scores may be transferred into mental age ratings or may be directly interpreted by reference to a table of norms.

The tests have been derived from various sources, but material from the Binet scale predominates. Modifications both of material and of procedure have been introduced freely wherever any advantage appeared to be gained thereby. For example, in the description of pictures, test 7, the test question was altered in order not to suggest the form of response.

Other things being equal, preference has been given to tests applicable through a considerable range of years, such as memory span and free association; and the differing reactions to a given test which are characteristic of successive stages of mental growth have been discriminated in the scoring wherever easily recognizable. For example, four gradations are recognized in the free associations test, two in definitions of concrete terms, four in counting backwards, and so on. To this end, also, the subdivisions of each test are credited separately, and in several instances partial credits are allowed on the subdivisions. In the comparisons of remembered objects, for instance, 1 point is allowed for one item of difference and 2 points for two or more such items.

The scale consists of over fifty questions grouped to form twenty tests. For each part of each test which is answered the subject receives a certain score, and at the end of the examination the scores for all twenty tests are added together to give a total score. Then from a table of norms, we find at what chronological age the average child attains that particular score, and this is, of course, the mental age of our subject. The IQ is obtained in the usual manner by dividing mental by chronological age. Thus, if a child of 10 years and 6 months, or expressed in decimals 10.5, receives a score of 69 points, we find from the table of norms that his mental age is 11.8. His IQ is, then, 11.8 divided by 10.5, or 1.12.

The Point Scale differs from the various forms of the Binet Scale in a number of ways. In the first place the entire Point Scale is given to each child examined.[1] Such a procedure is impractical with the Stanford revision of the Binet on account of the length of the examination, the amount of time which would be consumed, and the resulting fatigue in the younger children. Giving all the tests eliminates the possibility of an error in determining the point where the examination shall begin and the point where it shall end. Although such terminal points are fairly easily determined in the cases of normal children, they are much more variable in mental deficiency, epilepsy, dementia praecox, and all abnormal cases. In some such cases for example, the mental age varies greatly from day to day. Sarah K—, a girl of fifteen, attained a score late one afternoon which gave her a mental age of 5.6 years, but when tested again the following morning, was found to have adult mental age. Additional data gave evidence that the first examination happened to have been

[1] There is one case in which this rule may be neglected. If we are examining a four year old child who answers the question "What is a spoon?" by repeating "spoon" and who gives the same kind of reply for definitions of the other concrete words, there is obviously no necessity of asking for definitions of abstract terms. Such omissions are allowable only with very young children, and then only when the easier parts of the test have been failed entirely.

given at the end of an acute mental attack which cleared up completely before the next morning. In cases like this, it is essential that the entire examination be given. It happened that Sarah failed the great majority of the easy and passed a few of the much more difficult tests. If a year scale like the Binet had been used, none but a very experienced examiner would have considered the possibility of her passing any of the harder tests. When the examination was repeated the next day and the more difficult tests as well as the easy ones were passed, the query would immediately arise whether the hard questions might not have been answered the first time if they had been asked. Such uncertainty cannot occur when the entire examination is invariably given.

A second advantage of a point scale over a year scale lies in the fact that for each test numerical credit is allowed not merely for pass or fail, but for various degrees of success between such limits. Terman says[1] "It makes much difference . . . whether success in repeating six digits is earned by repeating all three (groups of digits) correctly or only one; or whether the child's lack of success with the absurdities is due to failure on 2, 3, 4, or all of them," and, therefore, he suggested that "each division of a test should be scored separately in order that the clinical picture may be as complete as possible. This helps in the final evaluation of the results." Thus, in the Stanford revision, if Henry detects *four* out of the five absurdities, he passes the test; if he detects all *five,* he passes and the examiner must remember in the final summarizing of the case, that Henry passed the absurdities *well;* if Henry detects only *three,* he fails, but the examiner must remember that he *barely* failed; and if Henry detects *none,* the examiner must remember that he failed *totally.* Suppose that at the end of the examination the examiner has to remember that Henry *barely* failed the absurdities, *barely* failed the comprehension of questions, and *barely* failed the giving of

[1] Terman, L. M. The measurement of intelligence. Houghton Mifflin Co., Boston, 1916, p. 133.

sixty words in three minutes, what shall he do? add a month of mental age? or what? In the Point Scale, there is no doubt as to procedure, for Henry gets credit for exactly what he does, that is, he get three points for detecting three absurdities, four for detecting four, etc. In the year scale, the most exact scoring possible is to add a "plus" to tests passed exceptionally well, and a "minus" to those which are barely passed. Then at the end of the examination, if there are equal numbers of plus and minus signs, we may ignore them; if there are many more of the plus, then our mental age as calculated is too low; if there are many more of the minus, then our mental age is too high. Such a method obviously is not so exact as a point scale method.

Furthermore, in a Point Scale, the individual tests may be scientifically weighted, whereas in a year scale, all tests are treated as of equal value. Thus for some tests in the Point Scale, such as "comprehension of questions" in which there are several parts, and where the answers may show a number of degrees of mental acuity, the child may receive a score from 0 to 8, whereas in the comparison of line-lengths, the highest possible score is one. This means that it is possible to give more weight to those tests which correlate most highly with the criteria of intelligence (age, school success, etc.).

A further advantage of the Point Scale is that all tests of one kind are given together.[1] Many examiners who use the Stanford Revision of the Binet have found it expedient to give all of the tests of memory span together, but the form of that scale necessitates turning from IV, 6 to VII, 3, to Superior Adult, 3; or in giving repetition of sentences, turning from III, 6 to VI, 6 and to still other ages if the alternative tests are needed.

Still another advantage is the greater ease of alteration of the Point Scale. With the accumulation of more and more results, intelligence tests are constantly being revised.

[1] Exceptions to this are found in tests 3 (*b* and *c*) and 8; in tests 10 and 19; and in tests 14 and 16. See p. 19.

In a year-scale this revision renders difficult or impossible the accurate comparison of results obtained with different revisions. For example, the Goddard revision of the Binet gives the naming of familiar objects and the giving of sex as 4-year tests, the Stanford revision places them in the 3-year group; the Goddard revision gives counting pennies and copying a square as 5-year tests, the Stanford as 4-year. Now suppose that in January John is given a mental age of 4.0 on the Goddard revision and that he has attained this mental age by passing all of year 3, all of year 4 except giving sex and naming familiar objects, and in year 5 has passed copying the square and counting pennies. In the following January he is given the Stanford revision, and passes all the 3-year tests (including the naming of familiar objects and the giving of sex), and in year 4, compares lines, copies the square, and counts the pennies. He receives a mental age of three years and six months, which is half a year less than his mental age twelve months before. Unless results for each test were consulted, we would suppose that John had deteriorated, instead of actually passing more tests than he did in the first examination. This, of course, would be an extreme case, but it might very well happen. If the child had been examined with the Point Scale both times, even if the accumulation of data had resulted in a change in the point scale norms between the two examinations, we could easily calculate what the earlier mental age would be if based upon the later norms. Of course, if the revision goes to the extent of introducing entirely new tests, in neither type of scale is it possible to make complete comparisons with previous results.

We have suggested a number of advantages which a point scale has over a year scale, particularly in the more exact grading of responses and the greater ease of revision. We come now to what in our minds is by far the greatest superiority of a point scale; its research and diagnostic value. Year-scales are of most value for use with normal or feeble-minded children, but the Point Scale may be used to equal advantage in the examination of all types of

abnormality. In order to use the Point Scale with any special group such as the blind or the deaf, we have two available methods: to secure data upon a fairly large group of blind or of deaf, and compile a table of norms to be used in place of the ordinary norms; or to follow the scheme which we present (p. 81ff) and calculate a series of corrections to be added to the total score obtained after omitting the tests which are impossible for the blind (or the deaf). Again, the Point Scale may safely be used with elderly people once we know what type of examination record these persons tend to give (see p. 77ff). Since the entire examination is given to each subject, since like questions are grouped together instead of being scattered through the examination in the order of difficulty, and since many abnormal cases tend to do particularly well or particularly poorly on some special kind of question, the Point Scale is pre-eminently fitted to reveal unusual patterns of response. For example, it has been shown that certain types of insanity are very apt to give unusual results in certain of the memory tests.[1] Without doubt, further investigation will reveal many other typical failures or successes. We should suppose, for instance, that manic patients would tend to give many words in three minutes (test 13), while depressed patients would give few. There is opportunity for profitable research in the responses of abnormal subjects to the Point Scale examination.

Not only do the arrangement of the Point Scale and the fact that the entire examination is given to each patient fit it for use with abnormal cases, but the fact that each test is given a more finely numerical score means that the results are open to more exact mathematical treatment. We can express our results in averages, medians, and modes as well as in the percentage attaining each score; we can calculate variations; we can run correlations; we can use graphs; in fact, we can use any of the ordinary statistical methods for treating results.

[1] Foster, J. C. Significant responses in certain memory tests. *Journ. of Applied Psychology*, 1920, 4, 142–154.

To be sure, with year scales we can use similar mathematical methods on our results as long as we are concerned with mental ages, but when we try to discover the ability of any particular group to pass any particular test, we are hampered by two facts. (1) Since the score for each test is merely "passed" or "failed," the median and the mode will be identical and an average of .5 or more means that the median and mode will both be 1, while an average of .49 or less means that the median and mode will both be 0. This is merely a restatement of the fact that the grading on point scale tests is more refined. (2) Since the entire Binet examination is not given to each subject, we cannot actually gain from the results the numerical data for the separate tests. Suppose, for example, that we happen to be studying a group of dementia praecox patients, and suppose that A receives a mental age of 5 yr. 0 mo. by passing all of year IV, and all of year V, including test 4 (the repetition of 4 digits), but since he fails all the VI year tests (although he fails VI, 2, missing parts, because he passes only 2) he is not given VII, 3 (repetition of 5 digits). Patient B, however, attains his mental age of 5 yr. 0 mo. by passing all of year IV, and by passing in addition V, 1, 2, 3, 4 VI, 2 and VII, 3 (repetition of 5 digits). This means that since B happened to give three missing parts correctly instead of only two as A did, B is given a chance at the 7-year tests, while A is not. Now suppose we want to state the average memory span for digits for dementia praecox patients of mental age 5. Shall we say that A's memory span is 4, just because he did not have an opportunity to try 5? For all we know, they both may have memory spans of eight or nine! A similar case, and one which as we shall see later, surely would arise in using the Stanford revision on elderly or psychotic persons, would appear in the "comprehension of questions" tests. Of these, there are four in the Stanford revision, falling at years IV, 5, V, 4, VIII, 3 and X, 5. This test is one in which older people do remarkably well, even when they have deteriorated appreciably and the examination is

obviously unfair to such subjects if any of these questions are omitted. But if we follow the rule of year scales and discontinue the examination when all the tests of one year have been failed, then an old or psychotic person who fails all of year V or all of year VII, or all of year IX has lost his opportunity to answer questions which are based chiefly upon experience.

Thus we see that if we are interested in the special abilities of abnormal persons as measured by their performance on different tests, the Point Scale is more satisfactory than a year scale.

Perhaps a word should be added here in regard to the use of the Point Scale and the Stanford revision of the Binet as alternatives for each other. We often wish to test a child every 6 months or every year, and it is extremely desirable that the child should not remember the examinations exactly. He may do himself an injustice on the second examination. For example, if he recognizes the question and remembers the examiner's praise for his former answer he may attempt to repeat what he said before, in spite of the fact that if he attacked the question now for the first time, his answer might be superior. In such cases, it is often advisable to give the Point Scale as the first examination, and then 6 months or a year later to give the Stanford revision. There are, to be sure, many identical tests, but there are enough different ones to prevent the identification of the two examinations in the mind of the child. That the two examinations may be used thus without serious divergence in the results is shown in the fact that the correlation between results on the two scales has been found[1] to be .87.

[1] Fernald, M. R., Hayes, M. H. S., and Dawley, A.: A study of women delinquents in New York State. The Century Co., New York, 1920, p. 58.

CHAPTER 2

DIRECTIONS FOR GIVING THE PRE-ADOLESCENT POINT SCALE

GENERAL DIRECTIONS

Place.—The examination should take place in a quiet, fairly small room. The attention of small children is so easily distracted that, if possible, the room should not be on the street, and the door should be kept closed so that the child can neither see nor hear persons passing by. A picture or two on the walls may be of service in getting acquainted with the child, but too many interesting objects in view will serve merely to distract his attention from the examination.

Arrangement of Material.—All the materials necessary for the test with the exception of the five weighted blocks, are printed at the end of this volume, but for regular use it will be found much more convenient to use a set of materials as they are printed upon loose cards.[1] The cards can then be placed on the desk before the child with little danger of the page being blown or turned over prematurely. Moreover, all such materials soil quickly, and ink spots and finger prints act as distractions. Some workers have made celluloid covers for the different cards, but we have found the most satisfactory method to be merely to throw the cards away when they become too soiled. This set of cards is most conveniently handled when they are strung together to make a little booklet. Then when not in use the booklet may be hung, together with another similar booklet containing the various norms, at the end of the desk away from the subject's chair, and so be always at hand and yet out of sight. In making up the booklet out of the cards, arrange the cards in the order in which they are

[1] C. H. Stoelting, 3037–3047 Carroll Avenue, Chicago, Illinois.

to be used. Then, using black gummed letters one half inch high, on the back of a convenient card write "Boston[1] money river," and on the backs of other convenient pages write the dissected sentences with the same gummed letters. These sentences can be read by many subjects whose poor eyesight renders illegible the sentences as they are printed on the cards or in the book and they may be used for all subjects if the examiner likes. The examiner will find it convenient to keep the five weighted block in front of him on the desk, arranged in the correct order with the numbers on the under side. He can then select the desired blocks quickly without referring to the numbers, and so keep many subjects from suspecting that the blocks are labelled.

Treatment of Subject.—Experience shows that the best procedure with children is to start conversation with them before they are seated beside the desk. There seems to be something awe-inspiring to many children in being seated in a chair facing an examiner at a desk, and oftentimes there is a resulting shyness which it is difficult to overcome. If the examiner himself goes to the waiting-room or to the class-room for the child, then the natural procedure is to take the child by the hand, and as you lead him along, to ask him such simple questions as his name, number of brothers and sisters, etc. If the child is brought into the examining-room by another person, we have found that the examination proceeds more quickly and smoothly if the examiner looks up at the moment the child enters the room and says "Hello! What is *your* name?" and then; "How old are you?" By the time these questions are answered the child is near the desk, the ice is broken, and after his school-grade is learned, the test begins in an easy conversational manner.

The treatment of adults usually requires more tact. They often resent the persistent and apparently senseless questioning from a person many years their junior. The examiner must use his own judgment in deciding the best manner of approaching each subject. Many patients in

[1] Or the name of the town in which the examination is given.

hospitals are so accustomed to questionings of all sorts that the suggestion that this is merely a part of the hospital routine or red tape suffices to procure cooperation, but with some superior adults it may be necessary to assume the confidential attitude that "of course you and I know that your mind is perfectly clear, but let's get it down in black and white that you could answer these questions."

When the examination is once begun, it should proceed smoothly and as rapidly as possible without haste. The expert examiner is able to record one answer while he is asking the next question. This method also saves the examiner much bother, for many children who are not kept busy while the examiner records will handle everything within reach, or their attention may wander to other interests.

The subject should never be corrected or shown that his answer is poor, but, on the contrary, should be constantly encouraged by such comments as "Good!" "That's fine!" etc. Such praise can, of course, be overdone. Adult subjects of fairly high intelligence may with reason be scornful when an inexperienced examiner acts as if the discrimination between a long and a short line is a remarkably clever performance! Once again, the examiner must use his own good judgment. Small children and low-grade feeble-minded adults usually give the best results under lavish commendation. Perhaps the safest rule to follow is: *Treat each subject in the way which he will consider most sincerely complimentary.*

Personality of the Examiner.—Examiners vary greatly in personality and consequently in success in securing cooperation. Some prove particularly successful in handling a specific type of subject. Most children and young adults will give satisfactory results for any experienced examiner. Those fitted for work with psychopathic cases, with very young children or very old people are less common. In the long run, women are more successful than men, chiefly because there are many cases which are difficult for a man to handle. Oftentimes a psychopathic, adolescent girl is too busy trying to flirt with a male examiner to be bothered

with answering questions, and many times a man is not quick enough or "natural" enough to do well with children.

Presence of Others.—No third person should be allowed in the room. If the examination is a demonstration, the observer should sit at some distance, and somewhat back of the child, and should not show the slightest interest in what is going on. Then if the examiner ignores the visitor, the chances are that the child will also. Never should the child's teacher be admitted, and no member of the family should be present unless it is absolutely necessary to use one of them as an interpreter. In case several members of an immigrant family are to be examined, the child with the best command of English should be examined first, and then that child may act as an interpreter for the others. It might seem as if by this method all our results would be merely the answers of the interpreting child. On the contrary we have had many cases where the second member of the family graded considerably higher or considerably lower than the interpreter. Of course, if the child is unable to understand the more difficult questions, there is little chance that he can interpret them correctly, but even so it is possible to get a fairly good notion as to the mentality of the rest of the family. If any considerable number of non-English speaking people is to be tested, it is worth while to have the questions translated into the desired language.

Wording of Questions.—The inexperienced examiner should adhere strictly to the wording of the tests. He should remember that any rephrasing of his own may invalidate not only the examination that he is giving but also all tests which the child may be given in the immediate future. It is not unusual to have a child exclaim during a second examination "The other lady didn't say that." With great experience, the examiner may discover a few minor changes in phraseology which may be used safely.

Records.—In so far as possible, the subject's responses should be recorded in full. In particular, notes should be kept on the subject's general attitude (cooperative, restless, etc.) and on any special unusual conditions (foreign

speaking, deafness, stuttering, etc.). All available data on the points listed under "Interpretation of results" below (p. 22) should be collected and noted by the examiner or others.

Order of Giving the Tests.—The examiner will find it convenient to give test 8 (arrangement of weights) immediately after 3 (*c*) (comparison of 6 and 15 gms.) Similarly, since tests 10 and 19 are both questions of definition, it is very easy to slip from "What is a baby?" (the last part of test 10) to "What does charity mean?" (the first part of test 19). Again, the square and diamond (test 12) are copied on the back of the record sheet, and the examiner will find it saves time to give test 16 (drawings from memory), next, while the child is thinking of drawings, then test 14 (sentence containing three given words), since this test also requires the use of the back of the record sheet. Probably the most time-saving order to giving the tests and the order least tiring to the subject is 1, 2, 3, 8, 4, 5, 6, 7, 9, 10, 19, 11, 12, 16, 14, 13, 15, 17, 18, 20.

Calculation of Mental Age and IQ.—When all the tests have been given and scored, the scores for the separate tests should be added together for a total score. Then if the subject is the child of English speaking parents, refer to the table of norms on p. 60 to discover what mental age corresponds to that particular total score. Calculate the child's chronological age in tenths. Thus:

1 mo.	.1 yr.	5 mo.	.4 yr.	9 mo.	.8 yr.
2 mo.	.2 yr.	6 mo.	.5 yr.	10 mo.	.8 yr.
3 mo.	.3 yr.	7 mo.	.6 yr.	11 mo.	.9 yr.
4 mo.	.3 yr.	8 mo.	.7 yr.		

and then divide mental by chronological age. This gives the Intelligence Quotient[1] (IQ). For example, if a child

[1] It was the early practice in the Point Scale to obtain not an IQ but a CI (coefficient of intelligence, the ratio of the total score obtained to the total score expected at the chronological age of the subject), but for various reasons (see Curtis, J. N.: Point scale examinations on the high grade feeble minded and the insane. *Journ. of Abnormal Psychology*, vol. 13, 1918, p. 77ff.) it has seemed best to conform with the more common usage of other scales and use the IQ.

of chronological age 9.5 receives a total score of 59, by refering to the table of norms (p. 60) we find the corresponding mental age to be 10.2 Then by dividing mental age by chronological age, we obtain the ratio $\frac{10.2}{9.5}$ or 1.07 as the IQ. If the subject is an adult, it is obviously unfair to use his chronological age as divisor, since the highest possible mental age obtainable on the scale is 18. If a man of 60 obtains a mental age of 18, and we use 60 as a divisor, we obtain an IQ of .30, which would place the subject as definitely feeble-minded, despite the fact that he obtained a very high score. It has been found that mental age increases but little after the 16th year, and therefore for all persons of chronological age of 16 or over, we use 16 as a divisor in obtaining the IQ. Thus in the case cited of the 60 year old man, we should divide his mental age by 16 instead of 60, and obtain as his IQ 1.13. Similarly if an adult receives a mental age of 16, his IQ will be $\frac{16}{16}$ or 1.00. If the total score is greater than 88, we record his mental age as 18+, and the IQ as 1.13+. Since we are thus unable to differentiate between the mental ages and IQ's of persons grading above 88 points, this Point Scale is really unsuited for work with above average or superior adults, and such persons should be examined with the Adolescent-Adult Point Scale described in Chapter 5.

The use of 16 as the expected mental age for adults may be questioned in the light of the experience of the psychological examiners in the United States army. They found, it will be remembered, that the average mental age for the white draft was approximately 14.0. Why then, it may be asked, do we not accept 14 as average adult mental age? The chief reason for persisting in the use of 16 is the fact that the point scale score continues to increase beyond the age of 14.

Interpretation of Results.—We must now consider the interpretation of results. What should we recommend for

a child whose IQ is .40? or .80? or 1.20? Terman[1] summarizes the IQ's of 1000 unselected children as follows:

The lowest 1 per cent. go to 70 or below, the highest 1 per cent. reach 130 or above.
The lowest 2 per cent. go to 73 or below, the highest 2 per cent. reach 128 or above.
The lowest 3 per cent. go to 76 or below, the highest 3 per cent. reach 125 or above.
The lowest 5 per cent. go to 78 or below, the highest 5 per cent. reach 122 or above.
The lowest 10 per cent. go to 85 or below, the highest 10 per cent. reach 116 or above.
The lowest 15 per cent. go to 88 or below, the highest 15 per cent. reach 113 or above.
The lowest 20 per cent. go to 91 or below, the highest 20 per cent. reach 110 or above.
The lowest 25 per cent. go to 92 or below, the highest 25 per cent. reach 108 or above.
The lowest 33⅓ per cent. go to 95 or below, the highest 33⅓ per cent. reach 106 or above.

Or, to put some of the above facts in another form:

The child reaching..... 110 is equaled or excelled by 20 out of 100
The child reaching (about)..... 115 is equaled or excelled by 10 out of 100
The child reaching (about)..... 125 is equaled or excelled by 3 out of 100
The child reaching (about)..... 130 is equaled or excelled by 1 out of 100

Conversely, we may say regarding the sub-normals that:

The child testing at (about).. 90 is equaled or excelled by 80 out of 100
The child testing at (about).. 85 is equaled or excelled by 90 out of 100
The child testing at (about).. 75 is equaled or excelled by 97 out of 100
The child testing at (about).. 70 is equaled or excelled by 99 out of 100

Terman then gives the following classification of intelligence quotients:

IQ	Classification
Above 140	"Near genius" or genius.
120–140	Very superior intelligence.
110–120	Superior intelligence.
90–110	Normal, or average, intelligence.
80–90	Dullness, rarely classifiable as feeble-mindedness.
70–80	Border-line deficiency, sometimes classifiable as dulness, often as feeble-mindedness.
Below 70	Definite feeble-mindedness.

Thus we may suppose that practically all children having an IQ less than 70 are feeble-minded. But never should

[1] Op. cit., p. 78ff.

such a diagnosis be made on the IQ alone. We must remember that numerous other conditions tend to lower the IQ. In the first place there is the rare case where the examiner fails, without realizing it, to gain the confidence of the shy child, and the hanging head, averted eyes, open mouth, and failure to attempt any but the simplest questions, may easily suggest feeble-mindedness. Then too, there are the cases of physical disease (fever, etc.) or psychosis where the mental age and IQ may be low temporarily, but may shortly come back to a normal level. Moreover, there are cases of deterioration, due to mental disease or to advancing age which may show a mental age suggestive of mental deficiency. To make a true diagnosis of feeble-mindedness, we need the judgment of the psychiatrist, social worker, teacher, as well as that of the psychologist. If the psychologist is compelled to work without the assistance of these other specialists, he must take upon himself the gathering of data upon all such points as the following:

1. Physical examination of the subject.
2. Developmental history of the subject.
3. Disease history of the subject.
4. School history.
5. School knowledge and general information.
6. Social history.
7. Economic history.
8. Family history.

The physical examination must cover all such points as eyesight, hearing, the presence of adenoids, or mouth breathing, stuttering, malnutrition, and other defects. All of these physical defects have been known to cause apparent stupidity which disappeared as soon as the defects were removed. In such cases injustice and definite social injury might be done to the child if he were dubbed feeble-minded.

The developmental history of the subject must cover such points as to whether or not he was a full term child,

whether the birth was normal,[1] at what age he first walked, and at what age he first talked. If these activities were unusually slow in making their appearance, we have additional evidence of feeble-mindedness, for in cases of serious mental defect, the child usually shows his retardation early.

We must study the disease history of the child and inquire particularly concerning scarlet fever, syphilis, and meningitis. Any of these may have injured the brain permanently.

The school history should include the age at which the subject first entered school, his progress through the grades, whether or not he was a repeater, perhaps his school marks, and surely the present grade or the highest grade reached and the age at which he left school.

Whether or not the subject has left school, it is important to know how much he has retained of what he was taught in school. With children still in school or recently graduated, this is easily obtained by some such simple examination as that given in the accompanying foot-note.[2] With

[1] Many parents hate to acknowledge the presence of feeble-mindedness in their families, and tend to explain the evident feeble-mindedness of a child of theirs as due to birth injury. Statistics show that such cases are really rare, and we must, therefore, add a "grain of salt" to these reports and persist in the attempt to discover abnormalities in relatives.

[2] *Geography. Grade* 3. This is (summer) now. What season will it be next? This direction is north. Where is east? What are clouds? *Grade* 4. What is the shape of the earth? Tell me the names of some oceans. What is a hill? brook? lake? In what town (or city) do you live? *Grade* 5. In what state do you live? What other states are near this state? What cities are there in (Massachusetts) (or whatever state the child lives in)? What mountains are there in North America? *Grade* 6. Tell me the names of some countries of Europe; of some cities of Europe. What kind of climate do they have in Central America? What are some of the industries in the West Indies? *Grade* 7. Tell me the names of some countries of Asia; of Africa. What European countries have colonies in Africa? Where is Australia? *Grade* 8. What are the principal exports of U. S.?

History. Grade 3. Do you know what Christmas is? What is it? What is Thanksgiving? Fourth of July? *Grade* 4. Who was Columbus? George Washington? Benjamin Franklin? *Grade* 5. Who was Cortez? Sir Walter Raleigh? John Smith? Who was living in America when the white people came? *Grade* 6. When was the U. S. settled? where? by whom? What was the Revolutionary War? *Grade* 7. What general in the Revolutionary War was made the first President? Who is President

adult subjects we must beware of expecting the details of school knowledge to be retained. A number of adult college graduates, all in professions, were asked to draw outline maps of South America and of Africa, putting in the chief countries. About one-fifth of the maps of South America were approximately correct, that is, not more than one or two countries were omitted or misplaced, while only about one-tenth of the maps of Africa included more than Egypt, the Desert of Sahara, and one or two Barbary states. Almost every pair of maps had some glaring error such as the placing of Madagascar on the east coast of South America. Do not, then, expect adults to retain school knowledge which they have not used since they left school. More important with these elder subjects, and also of considerable importance with children, is the amount of general information which they have acquired. Several lists of such general information questions have been compiled and they include such things as the distance between the place of residence and the next large town, the cost of various articles of clothing, etc.

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now? What other wars has the U. S. had besides the Revolutionary? *Grade* 8. What caused the Civil War? What is the Constitution? the Declaration of Independence? What are the duties of the mayor? the governor? the senators?

Spelling. Grade 2. Foot, for, cut, name, left. *Grade* 3. Point, ready, high, done, Tuesday. *Grade* 4. Forty, children, title, need, speak. *Grade* 5. Several, publish, running, secure, wait. *Grade* 6. General, decide, automobile, hospital, business. *Grade* 7. District, athletic, evidence, amendment, experience. *Grade* 8. Petrified, emergency, convenience, cordially, appreciate.

Arithmetic. Grade 1. Counts to 50, recognizes penny, nickle, dime. *Grade* 2. Counts to 100, recognizes quarter, half dollar, silver dollar. *Grade* 3. Adds 27 and 12, 33 and 42, subtracts 56 from 89, 42 from 74, multiplies 23 by 3, 41 by 5. *Grade* 4. Adds 54 and 38, 239 and 464, subtracts 48 from 72, 19 from 36, multiplies 17 by 4, 29 by 3, divides 64 by 16, 161 by 23. *Grade* 5. $\frac{3}{4} + \frac{1}{32} = ?$ $\frac{7}{9} - \frac{5}{36} = ?$ $\frac{4}{7} \times \frac{3}{8} = ?$ $\frac{3}{5} \div \frac{6}{7} = ?$. Multiply 3.62 by 41. Divide 151.92 by 72. *Grade* 6. Multiply 4.52 by .27. $\frac{7}{11} \times \frac{5}{9} \div \frac{1}{2} = ?$ Divide 98.31 by 3.7. *Grade* 7. What is six and a half per cent. of 250? What is the area of a triangle whose base is 15 and whose altitude is 16? What is the volume of a solid whose three dimensions are 8, 9 and 16? *Grade* 8. 12:36 = 24: ? The square root of 28,224 is what? What is the cube of 13?

The social history of a child is concerned with whether or not he plays with other children, whether or not he has been a delinquent, a truant, a petty liar or a petty thief. With older subjects we must inquire about his attitude toward his neighbors. Is the patient sociable, or is he more or less shut in? Many cases of insanity show themselves first in suspiciousness directed toward friends and neighbors, and in inability to get along with other people.

We must inquire further into the subject's economic history. What is his occupation;[1] his pay; what are his special interests? Is he holding his jobs steadily or is he constantly losing them or shifting to other places of his own accord? Any data showing the subject to be inefficient or to lack in "sticktoitiveness" is of great importance in suggesting feeble-mindedness or a psychosis.

In addition to all this information about the subject himself, we must learn what we can about his immediate family. What is the economic status or occupation of the parents? Have any brothers, sisters, aunts, or uncles feeble-mindedness, epilepsy, insanity, alcoholism, syphilis, tuberculosis? If any or many of these diseases or defects appear in near relatives, there is much more chance that they will appear also in the subject.

[1] Too much reliance must not be placed upon the name of the subject's position as an indicator of mental ability. At the Psychopathic Hospital in Boston, several physicians objected to the diagnosis of feeble-mindedness in one case on the ground that a feeble-minded clerk could not possibly give satisfaction. The questioning was then directed toward his activities in the store and the following dialogue took place. Examiner: "If sugar costs 9 cents a pound, how much would 11 pounds cost?" Patient: "I don't know." Examiner: "Then how would you know how much to charge a customer for it?" Patient: "Why that's easy, just weigh the sugar on the scales and then read down the column for 11 cents till you come to the place that tells you." Examiner: "How much is 42 from 50?" Patient: "I don't know." Examiner: "But if someone bought a pound of butter at 42 cents and gave you 50 cents, how much change would you give him? Patient: "Why take 42, and 1 cent is 43, and another is 44, and another is 45, and a nickel is 50." We see, then, that this clerk could add and could read numbers from the scale, but was unable to perform more complicated mathematics, and was, therefore, lower in mentality than his work would suggest.

When all this information has been collected with or without the aid of psychiatrist and social worker, the psychologist may be of great value in getting the subject into the most suitable place in society (school grade, special legal status, occupation, etc.).

We present below (pp. 28, 29) the form of record blank used in the Pre-adolescent Point Scale.

Directions for Giving and Scoring the Separate Tests

Test 1. Aesthetic Comparison.—The three pairs of Binet pictures (figures 1 and 2) constitute the materials for this test. In figure 1 the pairs (*a*), (*b*), and (*c*) are arranged as they are ordinarily used in the Binet scale: in figure 2 the positions of the members of the pairs are reversed.

With a sheet of paper or cardboard or even merely the examiner's left hand over pairs (*b*) and (*c*), present pair (*a*) of figure 1 to the subject, asking "*Which is the prettier of these two faces?*" (If the prettier is unintelligible, ask "*which is the prettiest?*"; if still you are not understood, ask "*Which do you like best* (or better)?" Record the subject's judgment, and immediately expose pair (*b*), repeating the question. The same procedure is followed for pair (*c*). If all of the judgments have been incorrect, the test may be considered failed, but if some or all have been correct, the examiner should turn to figure 2 and repeat the procedure. Two correct judgments are required for a success in any of the parts, whereas one incorrect judgment in either trial constitutes a failure. The two correct judgments are demanded for each part of this test in order to avoid the possibility of correct answers through chance or guessing.

Scoring.—Credit of 1 point is given for success in each of the three parts of the test (for each pair of correct judgments). Thus, the highest possible score for the test is 3.

Remarks.—The most common failure in the test comes in the comparison of the third pair of faces.

Test 2. Missing Parts.—The four Binet pictures (figures 3 and 4) are used in this test. Present the figure of a

woman (figure 3) and ask "*What is missing in this picture of a woman?*" If the subject obviously fails to understand "missing," say "*The woman is not all there. What part of her is gone?*" If the subject responds "hands" or "arms" pass on to the next part of the test; but if, instead, he says "hat," ask "*What else?*" If again he replies incorrectly, consider the attempt a failure and pass on to the next picture (figure 4). With the faces (*c*) and (*d*) of figure 4 covered, present face (*b*), asking "*What is missing in this face?*" If the subject replies "an ear" ask "*What else?*" If to this he replies incorrectly, pass on to the next part of the test. Present face (*c*), keeping face (*d*) covered, repeating the question "*What is missing in this face?*" As in part (*b*), give two chances and no more. Present next, in like manner, face (*d*).

Scoring.—The correct responses for these four missing part questions are: "arms" or "hands," "eye" or "eyes," "mouth," and "nose." Credit of 1 point should be given for each correct response. Thus, the highest possible score for the test is 4.

Remarks.—In this test fewest failures are made in part (*a*), and most in part (*c*).

Test 3. Comparison of Lines and Weights.—The materials for this test are the card with the two lines, 5 and 6 centimeters long, respectively, by 1 millimeter wide and 3 centimeters apart (figure 5) and the set of four weighted blocks 22 millimeters in their several dimensions and weighing respectively 3, 6, 12 and 15 grams.

(*a*) Present the lines with the longer one above, saying to the subject "*Which is the longer* (or longest) *of these two lines?*" If the answer is incorrect, proceed no farther; but if correct, remove the page from view, turn it upside down, and present it to the child with the longer line below, saying "*Which is the longer of these lines?*"

Scoring.—Give no credit if the subject fails on either the first or second trial. If both trials are given correctly, give credit of 1 point.

RECORD BLANK FOR YERKES-BRIDGE

DATE.....
EXAMINED BY.....
NAME..... DATE OF BIRTH.....

TEST	CREDIT
1. Chooses, twice, prettier in each of three pairs of pictures, (1 each).	
2. Sees picture lacks: (*a*) arms; (*b*) nose; (*c*) mouth; (*d*) eyes. (1 each)	
3. Compares, twice: (*a*) Lines, 5 and 6 cm. (1) (*b*) Weights, 3 and 12 grams. (1) (*c*) Weights, 6 and 15 grams. (1)	
4. Memory span for digits. (*a*) 374. 581. (1) (*b*) 2947. 6135. (1) (*c*) 35871. 92736. (1) (*d*) 491572. 516283. (1) (*e*) 2749385. 6195847. (1)	
5. Counts backward: 20–1 (4); 15–1 (3); 10–1 (2); 5–1 (1).	
6. Repeats: (*a*) It rains. I am hungry. (1) (*b*) His name is John. It is a very fine day. (1) (*c*) The sun is very large and red. Our train was more than two hours late. (2) (*d*) It is not necessary to hurt the poor little birds. It is night and all the world rests in sleep. (2)	
7. Reaction to three Binet pictures: enumeration, (1 each); description, (2 each); interpretation, (3 each). (*a*) Man and boy (*b*) Man and woman (*c*) Man	
8. Arranges weights: two trials. All correct but one (1); correct (2). Trial 1. Trial 2.	
9. Compares: (1 or 2 each) (*a*) Apple and banana (*b*) Wood and glass (*c*) Paper and cloth	
10. Defines in terms of use, (1 each); superior to use, (2 each). (*a*) Spoon (*b*) Chair (*c*) Horse (*d*) Baby	

RE-ADOLESCENT POINT SCALE EXAMINATION

GE..... MENTAL AGE..... I.Q.....
ATIONALITY..... SCHOOL GRADE..... TOTAL CREDITS.....

TEST	CREDITS
1. Resists suggestions: (1 for each of three resistances)	
2. Copies (on back of this sheet) (*a*) square (1 or 2); (*b*) diamond (1 or 2).	
3. Gives words for three minutes; 30–44 (1); 45–59 (2); 60–74 (3); 75– (4). 1st half minute. 2d 3rd 4th 5th 6th	
4. Writes (on back of this sheet) sentence containing Boston, money, river. Three words in two (2); three words in one (4).	
5. Comprehends questions: (2 each) (*a*) Missed train (*b*) Someone unkind (*c*) Action versus words (*d*) Forgive easier	
6. Draws (on back of this sheet) designs from memory, after 15 sec. exposure. (*a*) (1 or 2); (*b*) (1 or 2)	
7. Sees absurdity: (1 each) (*a*) Swinging cane (*b*) Unfortunate cyclist (*c*) Three brothers (*d*) Guide-post directions (*e*) Last ear	
8. Puts dissected sentences together: (2 each) (*a*) My teacher (*b*) A good dog (*c*) We started	
9. Defines: (*a*) Charity (2) (*b*) Obedience (2) (*c*) Justice (2)	
10. Analogies: (1 each) (*a*) Oyster is to shell as banana is to (*b*) Arm is to elbow as leg is to (*c*) Head is to hat as hand is to (*d*) Truth is to falsehood as straight line is to (*e*) Known is to unknown as present is to (*f*) Storm is to calm as war is to	

(*b*) The examiner next places before the subject the two blocks weighing 3 and 12 grams, respectively, leaving a space of about 5 centimeters between them, and saying "*Which is the heavier of these two blocks?*" If the subject merely points to a block and says "This one," ask "*How do you know?*" and if he still hesitates to touch them say "*You may touch them if you wish to.*" Beyond this, by way of encouragement or suggestion, the examiner must not go. He must carefully avoid suggesting by word or act the lifting of the weights as a method of comparing them, but he may say "You may touch them if you wish to," since otherwise certain young children may think that it is not allowable for them to touch the cubes. If the subject responds incorrectly, pass on to part (*c*); if the subject responds correctly by lifting the weights and selecting the heavier one, the blocks should be shielded from the child's sight, reversed in position, and a second trial given. In precisely the same manner, the blocks weighing respectively 6 and 15 grams should be presented for either one or two judgments according to the nature of the first response.

Scoring for Parts (*b*) *and* (*c*).—If the subject fails in either the first or second trial for part (*b*) give no credit: if he succeeds for both trials of part (*b*), give credit of 1 point. Similarly if either trial for part (*c*) is failed give no credit; but if both trials are successful, give credit of 1 point. Thus, the highest possible score for test 3 is 3 points, one each for the three parts.

Remarks.—The easiest part of this test is part (*a*). If either (*b*) or (*c*) is failed, both are likely to be failed.

Test 4. Memory Span for Digits.—The materials used for this test are presented in full on the record blank, and they are also reproduced below.

	1st trial	2nd trial
(*a*)	374	581
(*b*)	2947	6135
(*c*)	35871	92736
(*d*)	491572	516283
(*e*)	2749385	6195847

The examiner should say "*Listen, and repeat exactly what I say.*" He should then distinctly and at the rate of two digits per second, in a perfectly monotonous tone, repeat the digits under trial 1, part (*a*),—"3, 7, 4." He then pauses for the subject's response. If the subject fails to grasp the idea and makes no response, he should be told again to listen carefully and say just what the experimenter says. Then the same group should be re-presented. If the subject attempts to repeat them but makes a mistake, he is given a second chance under trial 2 of (*a*), with the digits "5, 8, 1." If the subject repeats this second group correctly, the experimenter immediately passes on to the group of four digits, trial 1 of (*b*)—"2, 9, 4, 7." If the subject fails in both trials for any given number of digits, the test is discontinued.

Scoring.—Credit of 1 point is given for each part in which the subject succeeds on either trial until a part is reached where both trials are failed. On this part a credit of 0 is given and 0 is given to the succeeding parts, without trying them. Thus, if the subject passes the first trial of part (*a*), he is credited 1 point and given the first trial of part (*b*), if this trial is failed the second trial is offered; if the second trial is passed, credit of 1 is given and the first trial of part (*c*) is given. Then if both trials of (*c*) are failed, the test is discontinued and a 0 score is given to parts (*c*), (*d*) and (*e*), giving a total score for the test of 2. The highest possible score for this test is 5.

Test 5. Counting Backward.—For this test, no printed material is necessary. Say to the subject, "*I wish you to count backward from* 20 to 1 *like this*, 25, 24, 23, 22, 21"—at this point pause and wait for the subject to continue the counting. If he is unable to make a start, the experimenter should himself continue "20, 19, 18, 17, 16"—and pause again to give the subject an opportunity to take up the counting. If once more the subject fails to make a start, the experimenter should continue "15, 14, 13, 12, 11"—when again he pauses for a few seconds. If the subject is still incapable of response, the examiner should count

"10, 9, 8, 7, 6"—and once more pause to give the subject a chance. If, after taking up the counting at any point, the subject makes a single mistake (reversal or omission), he should be asked to repeat. No second trial should be offered if more than one mistake is made in any section (from 20 to 16, or from 15 to 11, etc.). Not over thirty seconds should be allowed the subject for counting backward.

Scoring.—If the subject takes up the counting at 20 and proceeds without mistake, or with a single error, later corrected, to 1, 4 points credit should be given. If the mistake is not corrected, he should be credited with correct response for counting from the next multiple of 5 below his mistake. For example, if the count is "20, 18, 19, 17, 16," and so on correctly to 1, and this mistake is made likewise in the second trial, the subject is credited with 3 points for counting correctly from 15 to 1. If he counts correctly only from 10 to 1, he receives 2 points credit, and if only from 5 to 1, 1 point credit. Thus, the highest possible score, for this test is 4.

Remarks.—In most cases, the score on counting backwards will be found to be either 4 or 0, that is, if the child can count backwards at all, he can usually count from 20 to 1; but there is some probability that between approximately mental age 6 and mental age 9 partial credit will be received.

Test 6. Repetition of Sentences.—For this test, the materials appear on the record blank and they are also given below. They consist of four sentences as follows:

(*a*) It rains. I am hungry.

(*b*) His name is John. It is a very fine day.

(*c*) The sun is very large and red. Our train was more than two hours late.

(*d*) It is not necessary to hurt the poor little birds. It is night and all the world rests in sleep.

In this test the examiner should say "*Listen carefully and repeat just what I say.*" He should be sure that the subject is attending and should then read (or repeat)

slowing and distinctly the sentences under (*a*). If for any reason the subject fails to make any response, (*a*) should be read again and a second chance thus given him to get started. In case of failure to repeat (*a*) correctly, the examiner should present the sentences under (*b*), and if failure occurs in this part also, the test should be discontinued. If part (*c*) is failed, do not present part (*d*). The substitution of "is" for "was" in this part does not count as failure since the two words are so easily confused unless the examiner accents the verb in an unnatural manner.

Scoring.—For perfect repetition of (*a*), 1 point credit is given; for perfect repetition of (*b*), likewise 1 point credit; for perfect repetition of (*c*) or for repetition perfect except for the substitution of "is" for "was," 2 points credit; and for perfect repetition of (*d*), 2 points credit. Thus, the highest score for the test is 6.

Test 7. Description of Three Binet Pictures.—In this test the three Binet pictures (figures 6, 7 and 8) are used. The examiner should present picture (*a*) (figure 6) saying "*Please look at this picture and tell me about it.*" The form of statement is particularly important. If the examiner says "Look at this picture and tell me what you see," enumeration rather than description or interpretation is likely to be obtained from the young child. In response to the examiner's request "Please look at this picture and tell me about it," the subject may enumerate the parts of the picture, may describe it in terms of composition or action, or may interpret it in terms of meaning or purpose.

When the subject has responded as best he can to picture (*a*) and the experimenter has recorded the response in as great detail as he can without interrupting the examination with a long pause, picture (*b*) (figure 7) is presented with a repetition of the request "Please look at this picture and tell me about it." This in due course is followed by picture (*c*) (figure 8).

Scoring.—For simple enumeration, whether all articles are named correctly or not, give 1 point credit. As for example in (*b*), subjects will sometimes say "two men"

or "two women" instead of a man and a woman. For simple description, statements about the position of persons or objects, statements of color, or any statement concerning anything that can be *seen*, give 2 points. For a "story" about the picture, any statement that implies any sense other than sight (as, for example, statements of temperature, or sound), statements about anything that has happened before or is to happen after the moment at which the picture is taken, statements concerning the feelings of persons, or of the relationship between persons, give 3 points.

Thus for picture 7 (*a*), credit of 3 would be given to the following answers: "Man and boy. He's pulling that cart, got it loaded with something, pulling hard." "Man trying to pull it up." "Ain't got no horse." "Looks as if it was going to tip over." "Raining. Boy's father pulling load of furniture up hill." "Peddler's cart. Man sells things. Boy helps him." "Have no horse. Must be kind of poor, in war, bringing their furniture with them. Neither look very intelligent." "Heavy load. Men tired." "Seem to be moving."

Credit of 2: "Man and boy dragging cart." "Hay or something in team. Two men pulling it," "Pulling cart up. It's kind of tipping over. Man and boy." "Pulling load of furniture on wagon."

Credit of 1: "Man and boy." "Man and boy, furniture baskets, rain, post, tables."

Picture 7 (*b*). Credit of 3: "Man sleeping, lady thinking." "He's sick or dying, she is taking hold of his arm." "People look poor." "That lady shouldn't be there." "Man must be dead." "Man looks as if he was trying to help that woman." "Man and woman side of the road. Man older than woman." "She looks cold." "Man making love on a settee." "Man lost his hat." "Man looks dead. Must be his daughter." "Must be without a home, poor, man sick. Woman trying to tell what is the matter with him, both sad." "Out of work, hungry, poor." "Man sleeping."

Credit of 2: "Sitting down on a settee." "Lady sitting on a settee. Man side of her." "Lady and man. Lady holding on to man's arms." "In a park. Old man and woman sitting on a bench. Hat on ground."

Credit of 1: "Man and woman, trees, and snow." "Man and lady."

Doubtful case: "Lady and grandfather." When given by an older child "grandfather" may very well be interpretation, but when given by a young child, it is probably used merely as the name of any old man. In cases where the child's meaning is not absolutely clear, do not grade this part until parts (*a*) and (*c*) have been graded. Then if interpretation is given for those pictures, count "grandfather" as interpretation, but if the other pictures are merely enumeration, then "grandfather" should be considered as enumeration.

Picture 7 (*c*). Credit of 3: "Standing up to see in a house where they are camping out." "Looking out window for someone." "Watching to see if his wife is coming home." "Prisoned in." "He fell asleep standing up." "Peeking out the window." "Standing up. Lonesome. Looking out the window." "Standing as if saying prayers."

Credit of 2: "Standing up looking out of window." "Man looking in a glass." "Climbing up a tree." "Fixing the window." "Man reading."

Credit of 1: "Man, chair, box, two tables." "Telephone, chair, book."

Remarks.—In part (*a*) the most frequent description is "Man and boy pulling wagon" and the most frequent interpretation is some comment on the lack of a horse. In part (*b*), the most common description is "Man and lady sitting on settee" and the most common interpretation is "man asleep." In part (*c*), "standing up" and "looking out the window" are practically the only descriptions and "in prison" practically the only interpretation.

Test 8. Arranging Cubes According to Their Weight.—For this test the materials are the five wooden cubes, of which four were used in test 3.

The examiner should shuffle the cubes and place them on the table before the subject within easy reach, and should say "*These little blocks are all the same size, but they weigh different amounts. I wish you to place the heaviest one here and next to it, here, the one which is just a little less heavy: and then, here, the one which is a little less heavy than that; and then the one still a little less heavy; and finally, here, the lightest one of all.*" While saying these words, the examiner should point to the position on the table where each block belongs. It is essential to give this explicit form of direction to young children, whereas for older children or adults, it is necessary to say only, "*I wish you to arrange these blocks in order of weight, beginning with the heaviest one, here, and placing the lightest one here, at the opposite end of the series.*"

If the arrangement first made is not correct, a second trial should be given, and the subject should be cautioned to be careful and not to hurry too much.[1]

Scoring.—Credit of 2 points is given for a correct arrangement in either trial, and 1 point if in either trial the only error is the interchanging of two consecutive blocks. Thus, 1 point would be given for the arrangement 6, 3, 9, 12, 15, or for the arrangement 3, 6, 12, 9, 15; but no credit would be given for 6, 3, 12, 9, 15.

Remarks.—Errors are somewhat more apt to occur between weights 3 and 6 than between the other consecutive weights. The reason for this is not clear, since, according to Weber's law, we should expect this pair to be most easily discriminated.

Test 9. Comparison of Three Pairs of Objects.—No printed material is necessary for this test.

[1] In order to avoid showing the subject that the blocks are numbered, it is often best to move the row of blocks as arranged by the subject nearer the examiner, and to ask the next question immediately. While the subject is occupied with answering it is a simple matter to tip the row of blocks over and read the numbers from the underneath sides, without attracting the attention of the subject. Then, if there has been an error, they may be tipped up again, shuffled and again presented for arrangement.

The examiner should say, *"You know what an apple is and you know what a banana is? Tell me how they are different from one another."*

In the same way questions are asked for wood and glass, and for paper and cloth.

Many children are satisfied when they have given one point of difference, such as, for example "An apple is round and a banana is long" or "An apple is red and a banana is yellow." In such instances the examiner should say, in order to make certain that the child is unable to go farther *"What other differences are there?"* He should not, in any case, give other aid or encouragement than this.

Scoring.—Give credit of 1 point for one correct point of difference, in the case of each pair of objects, and 2 points for two or more correct points of difference, in the case of each pair. Thus the total possible score for the entire test is 6.

Give credit for such differences as:

(*a*): "Apple round, banana long." "Apple red, banana yellow." "Apple sometimes red, sometimes green, banana sometimes yellow, sometimes red." "Apple harder than banana." "You peel a banana with your fingers, have to peel apple with knife." "Banana sweeter than apple." "You can eat the skin of an apple, can't of a banana." "Skin of a banana is thicker." "Can get banana all the year, apple only part of the year." "Apple has stem, banana doesn't." "Apple has core, banana doesn't." "Bananas grow in bunches, apples don't." "Apple is juicier than a banana." "Apple weighs more than a banana." "Apple grows in cold climate, banana in warm." "Make cider of apples, not of bananas." "Apples easier to digest."

(*b*) Give credit for such differences as: "Glass is transparent, wood is not." "Wood grows, glass is made." "Use wood for houses, etc., glass for windows, etc." "Wood gets softer in water, glass does not." "Glass is more expensive than wood." "Wood is brown, glass is no color (or white)." "Glass generally comes in a flat sheet,

wood in blocks." "Wood has bark, glass doesn't." "Wood is generally painted or varnished, glass isn't." "Can drive nails into wood, can't into glass."

(*c*) Give credit for such differences as: "Paper tears more easily than cloth." "Cloth is woven, paper is pressed." "You can write on paper, can't on cloth." "Can sew on cloth, can't on paper." "Cloth is for clothes, paper for wrapping." "Paper is generally smoother than cloth." "Cloth is more expensive than paper." "Cloth washes, paper doesn't." "Cloth is generally thicker than paper." "Paper is made from wood or rags, cloth from threads." "When you crumple up cloth, can smooth it out again, can't paper." "Paper burns more easily than cloth."

Give *no* credit for "Paper is white and cloth is white." "You can write on paper, well, you can write on cloth too."

Doubtful.—"Apple is *red.* Banana is *long.*" If the subject implies the opposite, give credit. (This happens often with average adults.) If the opposite is not implied, do not give credit. This answer of course does not show as logical train of thought as when the differences are paired off. Count such as "You can write on paper, and you can sew on cloth" as one difference,—that of use; but count "You can write on paper and you can't on cloth. You can sew on cloth, but not on paper," as two differences."

Remarks.—The differences between apple and banana most commonly given are: shape, color, kind or size of seeds, method of peeling, and the edibility of the skin. The differences between wood and glass most frequently given are: transparency, use, ease with which it is broken, and inflammability. The differences between paper and cloth most frequently given are: use, ease with which it is torn, possibility of writing on it, and possibility of sewing it. From this we see that the differences most commonly given are those of appearance and use. Differences in use are not given for the apple and banana, since the use of the two is the same; similarly, differences in appearance are not given for paper and cloth.

Test 10. Definitions of Concrete Terms.—The terms which are to be defined are printed on the record blank and are: (*a*) spoon; (*b*) chair; (*c*) horse; (*d*) baby.

The examiner should ask "*What is a spoon?*" then pause for the subject's reply, record, and then proceed to ask, similarly, "*What is a chair?*" and so on.

Scoring.—General rules for scoring this test are to give full credit (2 points) for classification, or for detailed description; and to give half credit (1 point) for definitions in terms of use, or in terms of some attribute of the object as "baby cries," or for words which are practically synonymous, as "infant," or "rocking chair," or for meagre description.

The highest possible score for this test is 8.

(*a*) Give full credit (2) for "Silverware." "Piece of silver." "Article used to eat with." "Instrument used to eat with." "Long and round at top, cylindrical, use to eat with and to measure by." Give half credit (1): "What you eat out of." "Stir things with." "Silver." "Tin." "You can eat from it. It is silver." "Little lead thing." "Round."

(*b*) Give full credit (2) for "Piece of furniture." "Wood ware." "Article you sit on." "Four legs and four rounds, back and seat to sit on." "Wooden object." Give half credit (1) for "What you sit on." "Have four legs, sit on." "Wood." "Made of wood, four legs." "Wooden chair with soft cushions." "One kind of chair is different, rocking-chair." "Rocking-chair."

(*c*) Give full credit (2) for "Animal." "Domestic animal." "Quadruped." "Beast of burden." "Four legs, tail, two eyes, mouth and nose that eats." Give half credit (1) for "What you drive." "To ride on a team." "Four legs, ears." "What ploughs and does farm work." "To work with."

(*d*) Give full credit (2) for "Creature, two legs, and head just like we are." "Human being." "Small child." "Child under three or four years." "Little girl or boy." Give half credit (1) for "What you rock." "Crying."

"Small and horse is bigger." "Infant." "To creep on floor." "To care for." "Little boy to your mother." "Grows up, gets big all the time." "Nurse to look after the baby." "Belongs to a mother."

Remarks.—In cases where partial credit is given, the most common definitions are in terms of use (or in case of "baby" statements such as "you rock," "cries," etc.) and the next most common half-credit definitions are definitions of the material of which the object is made.

Test 11. Resistance of Visual Suggestion.—The materials for this test consist of the six pairs of lines presented in figures 9 to 14. In each case the members of a pair are separated by a distance of 1 centimeter. The lines are approximately 1 millimeter in width. The measurements for the several pairs are as follows: pair (*a*), lefthand member 4 centimeters (cm.), righthand member 5 cm.; pair (*b*) 5 cm. and 6 cm., respectively; pair (*c*), 6 cm. and 7 cm. respectively; pairs (*d*), (*e*), and (*f*), 7 cm. and 7 cm.

As the experimenter presents pair (*a*) he asks "*Which is the longer of these two lines?*" He notes the response, preferably remembering rather than stopping to record it, turns immediately to pair (*b*) and repeats his question. He next presents pair (*c*) again repeating the question in precisely the same way. Without delay, he next presents pair (*d*) *changing the form of the question to "and of these"* repeating the same question for pairs (*e*) and (*f*). The subject's judgment in the case of each of the six pairs should be recorded.

If any one of the judgments for the first three pairs of lines (*a*), (*b*), (*c*) is incorrect, the test should be discontinued.

Scoring.—If an error is made in pair (*a*), (*b*) or (*c*), a score of 0 should be given. If, in case of the pairs of lines (*d*), (*e*), (*f*), the subject replies that the lefthand member of the pair instead of the righthand member is longer, or if he says they are equal, 1 point credit is given for each the three pairs. That is, 1 point credit is given for each resistance of the suggestion, from the first three pairs of

lines, that the righthand member of the pair is longer. Thus, the highest possible total score for the test is 3.

We have noted that various examiners misunderstand this test and give it wrongly. They often give credit for the judgments concerning (*a*), (*b*), and (*c*). We therefore call special attention to the directions and emphasize the need of a thorough understanding of the purpose of the test in order to give it correctly and properly evaluate the results.

Test 12. Copying a Square and a Diamond.—For this test the materials, consisting of a square, 4 centimeters (cm.) on the side (inside measurement) with lines 1 millimeter (mm.) wide; and a diamond 5 cm. on the side (inside measurement) with lines 1 mm. wide are presented in figures 15 and 17.

The experimenter proceeds with part (*a*), figure 15 of the test, by turning the record sheet face down before the child, and then placing the square just above it, saying "*Please draw on the back of the record sheet with this pencil a figure just like the one before you,*" and point to the square. It is, of course, absolutely necessary, if comparable results are to be obtained, that the square be placed directly in front of the subject, so that he does not get a distorted image of it.

As soon as the square has been completed, the experimenter should proceed with part (*b*) of the test by presenting part (*b*), the diamond, with the repetition of his former request in precisely the same words. It is essential that the figure of the diamond be placed squarely before the subject with the orientation which it has in figure 17.

Scoring.—(*a*) Give full credit (2) for any figure which shows approximate equality of both lines and angles: 1 point for any figure which shows approximate equality of angles but not of lines, and 1 point for any figure which shows approximate equality of lines but not of angles; for anything poorer, no credit should be given.

(*b*) Give full credit (2) for any figure which shows approximate equality of both pairs of opposite angles; and

1 point for any figure which shows approximate equality of only one pair of opposite angles; no credit should be given for anything which is indistinguishable from the square or unidentifiable really as a diamond.

Examples of common types of drawings, and their scoring are given in figures 16 and 18.

Test 13. Free Association.—The only materials used in this test are the examples. These the examiner should commit to memory thoroughly, so that he can give them quickly, surely, and without reference to the printed page.

The examiner should say to the subject. "*I wish you to say all the words that you can think of in three minutes. When I say "ready" you begin and say as many words as you can before I tell you to stop. Say such words as pin, table, grass, trees, clouds, horse, dog, brook. All ready! Begin.*" With either a stop-watch or the second-hand of an ordinary watch to guide him, the experimenter keeps track of the passage of time, while recording, in the space for the appropriate half-minute on the record sheet, a stroke for each word uttered. If the child stops, as though assuming that enough words had been given, at the end of a half-minute period the experimenter should say, "Go on, please" and he should repeat this if necessary, at the end of each half-minute of the three-minute period. Repeated words, if recorded the second time, should be indicated by a dot above the stroke. But it is even more convenient to omit them entirely, and it is a great advantage in counting the words if the strokes are grouped in fives by crossing each successive group of four.

Especially important in this test is the giving of the same words as examples and the stimulation or attraction of attention to the task, if necessary, at the end of each half-minute.

If the child starts giving memorized lists such as "one, two, three, four, etc." or "Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut," he should be stopped and told to give separate words. It may even be necessary with some children to remind them of the

kind wanted by repeating once more "pin, table, etc." It is obviously unfair to credit a child for each word given if he names lists or recites poetry, etc.

Scoring.—Credit is given for words and phrases (except in the case of repetitions) as follows: 1 point credit for from 30 to 44 words, inclusive; 2 points for from 45 to 59 words, inclusive; 3 points credit for from 60 to 74; and 4 points for 75 and upward.

Test 14. The Use of Three Given Words in One Sentence.—If the examiner has prepared the examining cards with black gummed letters as was suggested (p. 16), then he should use the card bearing the words "Boston (or the name of the town in which the child lives) money, river." If he has not prepared such a card, then he should write the words plainly on the back of the record sheet.

He should then show the words to the subject, read them aloud twice and say "*I wish you to make one sentence in which the three words Boston, money, and river are used.*" The examiner must make perfectly certain that the subject understands the three words and knows what is meant by a sentence. We have found it best to assume at first that the subject does know what is meant by a sentence, for many children will grasp the meaning from the context of the request; if we begin the test by asking "You know what a sentence is, do you not?" it is not at all uncommon to have a certain type of child say "You mean thirty days?" and thus necessitate the statement that there are two kinds of sentences, etc. The subject should also grasp the fact that one, not two or more sentences, is required. This fact can usually be conveyed by the emphasis which the examiner gives the words. The sentence need not be written by the subject unless he prefers to do so but should be recorded by the examiner.

Scoring.—Full credit (4 points) for a single sentence containing all three words when the sentence does not have verbs connected by "and." If the verbs are connected by "and," give full credit if the connection of the sense is very close. "Boston" may be used as an adjective.

The sentence does not have to be true. Examples of sentences receiving full credit are: "I am going to Boston to spend some money on the river." "I went to Boston to see the pretty river and spent most of my money." "I lost some money in the river going through Boston." "I went to Boston shopping and had enough money left to go on the Charles river canoeing." "The Boston money works is near a river."

Give credit of 2 points if the three words are used in two separate sentences or in sentences very loosely connected, as "I went to Boston to see my father to get some money and I saw someone fall in the river." "Boston is a money-making place and which a river passes near." "To go to Boston you have to have money and you cross the Charles river." "Boston has got a lot of money in the state and the river is out in the ocean." "I am going to Boston to get some money next week; I am going to the river today."

Give no credit when the three words are used in three sentences or when only two of the words are used, as "I went to Boston one day to spend money." "I go to Boston and bring money and saw a lady fall in the river."

Test 15. Comprehension of Questions.—The materials for this test are the following four questions, each of which is indicated by two or three words on the record blank: (*a*) *If you were going away and missed your train, what would you do?* (*b*) *If someone has been unkind to you and says he is sorry, what should you do?* (*c*) *Why should you judge a person by what he does rather than by what he says?* (*d*) *Why do we more readily forgive an unkind act done in anger than one done without anger.*

The examiner should repeat the question (*a*) slowly and distinctly twice, and then encourage the subject, if necessary, to make some reply. The answer should be recorded on the record blank either in full or in substance. The examiner should in like manner present questions (*b*), (*c*), and (*d*).

Scoring.—General rules: Give full credit (2) for full logical answers; and for incomplete answers in some cases

where the remainder is implied, as for (*c*) "Can *see* what they do." Give half credit (1) for answers which show some slight grasp on the whole situation.

(*a*) Full credit (2): "Look for another train. Wait at depot." "Take electric car." "Ask what time the next train went." "Take a taxi." "Telephone." Half credit (1): "Go any place at all." "Have to stay there." "Wait till it comes back." "Take a watch and see how many minutes." "Go home." No credit: "Run for it." "Hurry." "Go to Boston."

(*b*) Full credit (2): "Forgive them." "Pardon them." "Be nice to them." "Tell them all right and not do it again." "Do to them as you'd like them to do to you." "Make up with them again." Half credit (1): "Serve them back." "Go up and tell them you feel the same." "Like them." "Say welcome." "Do nothing." "Let them go." "Pay no attention to them."

No credit: "Thank you." "Apologize." "Be sorry to them." "Take it back."

(*c*) Full credit (2): "He don't mean all he says." "Things he did more accountable than what he says. Perhaps what he'd tell you wouldn't be true." "Can tell by their actions and by the way they say it whether they mean it or not." "Might do something he said he wasn't going to." "Can *see* what they do." Half credit (1): "You can judge people by their actions, can tell by what they do." "Actions speak louder than words." "When he acts it, it shows more gratitude." "He does more than he says." No credit: "Cause he's disagreeable." "Should judge him in his ways." "See for yourself what he does, can mostly tell when a person is all right, and when they're in wrong." "Supposed to do the right thing." "Shouldn't judge them at all."

(*d*) Full credit (2): "Think they don't mean it, they're in such a temper." "When they did it, they didn't stop to think; when they're not in anger, they plan to do it." Half credit (1): "When they mean a thing, don't forgive them." No credit: "Because they apologize and think

more of it." "One might be done by accident; one with anger means to do it." "Better to do things without anger."

Test 16. Drawing Designs from Memory.—The materials for this test are the two Binet designs given in figure 19.

The examiner should say to the subject, "*I am going to show you two drawings. After you have looked at them, I shall take them away and ask you to draw both of them from memory. You must look at them carefully because you will see them for only fifteen seconds, and that is a very short time.*"

The examiner then places the back of the record sheet before the subject, and presents the designs in the orientation indicated by the figure, and with either a stop-watch or the second-hand of an ordinary watch, determines properly the interval of exposure. The subject is then immediately given a pencil to reproduce the designs on the record sheet.

Scoring.—Figures 20 and 21 give typical reproductions and their evaluation. In general, credit of 2 points is given for each correct reproduction even although the lines of the drawing are irregular. For imperfect reproductions, such as those in which the rectangle is placed in the center of the prism section, figure 20, or the small squares of design (*b*) turned outward, instead of inward, figure 21, 1 point credit is given. No credit is given for anything poorer than the above.

Remarks.—The most common error in the first drawing is to draw the figure as a cube. The reason for this is apparently that the subjects name the figure a "box" and then afterward draw the ordinary figure of a box. Types of drawings given by the insane are reproduced in figure 24.

Test 17. Criticisms of Absurd Statements.—The following five absurd statements constitute the material for this test:

(*a*) *We met a finely-dressed gentleman. He was walking along the street with his hands in his pockets and swinging his cane.*

(*b*) *An unlucky bicycle rider fell on his head and was instantly killed; they took him to the hospital and fear he cannot get well.*

(*c*) *A little boy said: "I have three brothers, Paul, Ernest, and myself."*

(*d*) *At the crossroads was a guide post with the following directions: Boston, three miles and a half; if you can't read, inquire at the blacksmith shop.*

(*e*) *It has been found that the last car of a train is damaged most in case of accident. It, therefore, would be better to leave off the last car.*

The examiner should proceed by saying, "*I am going to read some sentences to you. In each one of them there is something foolish or absurd.*" (He should make sure that the child understands what is meant by "foolish" or by "absurd.") "*Listen carefully, and tell me each time what it is that is foolish.*" He should then repeat (*a*) slowly and distinctly twice and ask, "*Now what is foolish about that?*" So, in turn, each of the five parts of the test should be presented and the subject's response recorded in as great detail as is practicable.

After a reply has been made, it is safest to question a subject, especially if a young child, to make sure that he really appreciates the absurdity. For example the child may reply to question (*c*) "myself," and in answer to further questioning may say that the speaker should have used his own name. This, of course, indicates that he does not appreciate the absurdity.

Scoring.—No partial credits are allowed. Give full credit (1) for such answers as:

(*a*) "Couldn't swing cane with hands in pockets." "Can't have hands in pockets and swing cane unless he had cane on his arm."

(*b*) "If he was dead, taking him to the hospital wouldn't do any good." "If he's killed he can't get well."

(*c*) "Trying to make you think he had an extra brother." "Couldn't be a brother to himself." "Only had two."

(*d*) "If they can't read the first sentence, they can't read about the blacksmith." "Who was there to tell him to inquire at the blacksmith shop? The post couldn't tell him." "If you couldn't read, how could you read at all?"

(*e*) "If they left the last one off, the one next to the last would be in as much danger." "There would always be a last car."

Test 18. Construction of Sentences.—For this test the three groups of words presented in figure 23 or made of the black gummed letters which we have suggested (see p. 16).

The examiner should say to the subject, "*You see these words, read them to me please.*" And having assured himself that the subject recognizes the words, he should continue, "*Now please arrange them so that they make sense. Make one good sentence out of them, using every word that you read, but no other words.*"

The subject should be allowed only three minutes for actual work on this test. The sentences are to be spoken, not written.

Scoring.—Give full credit for any English sentence containing all the given words and no other words. No half credits are allowed. Give full credit (2) for such answers as:

(*a*) "I asked the teacher to correct my paper." "I asked my teacher to correct the paper." "The teacher I asked to correct my paper."

(*b*) "A master defends his good dog bravely." "A good dog defends his master bravely."

(*c*) "We started for the park at an early hour." "We started early for an hour at the park." "We started for the park at an hour early." "We started early at an hour for the park."

Test 19. Definition of Abstract Terms.—The three abstract terms used are (*a*) charity, (*b*) obedience, and (*c*) justice.

The examiner should say simply "*What does charity mean?*" and after recording the response, "*What does obedience mean?*" and so on.

Scoring.—No half credits are given. The definition of charity should express two ideas, that of unfortunates, and of kindness shown to them. If the subject replies "love" ask him "what sort of love?" or "to whom is the love

shown?" If for obedience, the subject says "to obey" ask him what obey means. The definition of justice should express the idea of persons treated according to their merits, of fairness, or of protection accorded to people and their interests. If the subject replies "justice of the peace" or names an individual, he should be told that that is not the kind of justice meant and should be given another trial.

(*a*) Give full credit (2) for answers such as: "Take pity on people that ain't got no homes." "Anybody is poor and ain't got no home, the charity helps them along." "To give to the needy." "When you look out for a poor person." "Love for the poor." "Society to take little wanderers and put them in homes." No credit: "Give anything away that you have." "People have kind of society and help." "To do anything for anybody for nothing." "Love toward your neighbor." "Helping." "Kindness."

(*b*) Full credit (2): "Mind the attendant, what they say." "To mind." "Do what you are told."

(*c*) Full credit (2): "Do right by others." "Treat everybody the same." "To be fair and square with everybody." "To give one person his rights." "Not to let one do what you wouldn't let another do." No credit: "To do as you would be done by." "Doing right." "To do right." "The law."

Remarks.—With very young children we often find in this test a confusion of the abstract with some similar concrete term such as "carriage" (chariot?) with "charity;" "priest" with "obedience;" and "digestion" with "justice."

Test 20. Analogies.—The six analogies presented below are employed:

(*a*) Oyster is to shell as banana is to—(skin or peel).

(*b*) Arm is to elbow as leg is to—(knee).

(*c*) Head is to hat as hand is to—(glove or mitten).

(*d*) Truth is to falsehood as a straight line is to—(a crooked or a curved line).

(*e*) Known is to unknown as present is to—(future or absent).

(*f*) Storm is to calm as war is to—(peace).

The examiner should proceed as follows: "*If I say 'man is to boy as woman is to—,' what should you say?*" He should then pause for a second, and if the subject does not respond "girl" he should himself supply the word and continue "for girl has the same relation to woman as boy has to man." He should then proceed to give two additional examples, allowing the subject to supply the missing term in each case, or, if he cannot do so telling him what it is. The examples are: "Boat is to water as train is to—(track);" "Chew is to teeth as smell is to—(nose)." Having made such preparation for the actual test, the examiner should caution the subject, "Now, think well before you speak. Don't hurry." He should then present (*a*), record the result, and pass on to (*b*), and so on.

The test will proceed more smoothly, if the examiner will emphasize the important words, as "*Oyster* is to *shell* as *banana* is to—." It is particularly important not to accent the second "to." In analogy (*d*) care should be taken to say "*straight line*" and not "*straight* line." In the latter case many very young children who fail to comprehend the test at all, will answer "crooked" if the examiner says "straight" and then waits for a response.

Scoring.—Credit of 1 point is allowed for the following replies: (*a*) "skin," "peel," "peeling;" (*b*) "knee;" (*c*) "glove," "mitten;" (*d*) "crooked line," "curved line," "crooked," "a curve;" (*e*) "future," "absent;" (*f*) "peace."

Remarks.—The most common error among young children is to take the final "to" as the beginning of an infinitive. Thus, we find many children giving "eat" as the completion of the first analogy.

CHAPTER 3

RESULTS OBTAINED WITH PRE-ADOLESCENT POINT SCALE

NORMAL UNSELECTED SCHOOL CHILDREN

In the original Point Scale investigation, examination was made of approximately 850 individuals whose mentality was at least sufficient for the adjustments demanded by their surroundings.

Of these individuals, about 700 constituted the population of a city grammar school located in a medium to poor region and including grades from the kindergarten to the eighth. All pupils except those absent during the periods of examining were measured by the Point Scale; but from the records obtained several had to be excluded because of extreme language difficulty or incompleteness of record. The group from this school (hereafter designated as School B) finally selected for report includes 675 pupils. Of these 379 are boys and 296 are girls.

In a second city grammar school, which is located in a good neighborhood, the pupils of the kindergarten and first grade were examined. These numbered 60. But the extreme defectiveness and incompleteness of report in six cases force the exclusion of these individuals from the tables, and the group in this school (which we shall designate hereafter as School A) is constituted by 54 pupils, of whom 26 are boys and 28 are girls.

In addition to the above 729 children, 76 adults, ranging in age from 17 to 43 years and including 67 males and 9 females, were examined. At a later date Yerkes and Wood[1] used in addition to these cases the records of 166 pupils in

[1] Yerkes, R. M. and Wood, L.: Methods of expressing results of measurements of intelligence: Coefficient of intelligence. *Journ. of Educ. Psych.*, vol. 7, 1916, p. 593.

Iowa schools, and an 18 year old group in Cincinnati to correct the original norms.

In Schools A and B no selection was exercised in connection with the examining, but in the event that an examination could not, for any reason, be given fairly, the record was rejected. Work in the schools was not, so far as we could discover, seriously influenced by the spread of information concerning the tests. In each school we commenced with the kindergarten and worked up through the grades, assuming that the younger the pupils, the less they would be able to tell their playmates concerning the method of examining. From the third grade on we made it the rule to inquire, before beginning the examination, into the nature and extent of the individual's knowledge of the scale. We were somewhat surprised to find that with very few exceptions the children had learned nothing of any consequence from their fellows, and in only a small number of cases was it necessary to exclude an examination or make allowance for undesirable information. Our experience indicates that in a large grammar school the children are unable to remember accurately and to describe to their companions the tests used in the Point Scale. Such information as they give is very general and usually misleading. We are, therefore, confident that our results have not been influenced to any considerable extent by the spread of information.

The tests were given under extremely favorable conditions, in rooms which were quiet and comfortable, and the examinations were almost invariably free from the disturbing influence of a third person. We have every reason to suppose that apart from the possible slight variations due to different examiners our results are strictly comparable, and the latter difficulty is not a serious one, since approximately four-fifths of the examinations were made by five experienced examiners[1] whose knowledge of the Point Scale was thorough-going and detailed, and who by

[1] R. M. Yerkes, J. W. Bridges, K. F. Puffer, R. S. Hardwick, and L. D. Pedrick.

frequent consultation on points of method and of the values of results, tried to render their records both reliable and comparable.

Further to increase the comparability of results, each record was examined by Dr. Yerkes and Dr. Bridges so that all doubtful cases could be discussed and passed upon. This procedure unquestionably eliminated many irregularities in the grading of certain of the tests.

TABLE 1.—DISTRIBUTION OF POINT SCALE SCORES BY CHRONOLOGICAL AGES (SCHOOL B)

Total score	Age											
	4	5	6	7	8	9	10	11	12	13	14	15
5–9	1											
10–14	1	4	2	1								
15–19	2	12	7	4	1							
20–24	1	10	12	7	2	2						
25–29	..	7	17	9	6							
30–34	..	5	17	10	6	3	..	..	1			
35–39	..	1	11	22	12	2	2	..	..	1		
40–44	..	..	4	14	13	13	7	3	..	..	1	
45–49	..	..	1	6	12	10	4	5	2	2	..	1
50–54	..	..	..	..	5	12	9	9	2	1	1	1
55–59	..	..	..	..	4	12	14	10	4	3	..	2
60–64	..	..	..	..	..	7	9	10	6	3	2	1
65–69	..	..	..	..	..	8	15	18	5	4	6	1
70–74	..	..	..	..	..	4	7	11	7	9	2	
75–79	..	..	..	..	..	1	6	7	11	4	11	7
80–84	..	..	..	..	..	..	3	3	5	15	13	3
85–89	..	..	..	..	..	..	..	2	11	14	6	3
90–94	..	..	..	..	..	..	..	1	4	3	10	4
95–99	..	..	..	..	..	..	..	..	2	1	..	2
No. of cases..	5	39	71	73	61	74	76	79	60	60	52	25

The results for the group of 675 pupils in School B appear in table 1. They are classified according to both age and score. Each individual is represented by his total score in the examination. A given age group includes all individuals from the middle of the year below to the middle

of the one above. Thus in the group of four-year-olds are included all children from three years seven months to four years six months. Consequently the extreme age limits in the table are three years seven months and fifteen years six months.

If from the 675 pupils of School B, we exclude those born of foreign-speaking parents, we have a distribution of total scores which is given in table 2 in percentages.

TABLE 2.—PERCENTAGE OF ENGLISH-SPEAKING GROUP ATTAINING DIFFERENT TOTAL SCORES

Total score	Age											
	4	5	6	7	8	9	10	11	12	13	14	15
5–9												
10–14	33	11	4	2								
15–19	33	25	4	2	2							
20–24	33	32	16	10	2	2						
25–29	..	18	27	8	6							
30–34	..	11	27	10	13	2						
35–39	..	4	16	31	17	2	2	..	..	2		
40–44	..	..	4	23	19	12	4	2				
45–49	..	..	2	13	21	14	6	5	..	2		
50–54	..	..	..	..	11	12	11	9	2	..	3	
55–59	..	..	..	..	9	19	19	15	10	..	..	6
60–64	..	..	..	..	..	9	11	16	10	5	3	
65–69	..	..	..	..	..	16	24	20	3	5	8	
70–74	..	..	..	..	..	9	9	16	7	12	3	
75–79	..	..	..	..	..	2	9	7	20	9	24	38
80–84	..	..	..	..	..	..	4	2	10	23	24	19
85–89	..	..	..	..	..	..	..	4	25	32	14	13
90–94	..	..	..	..	..	..	..	2	10	7	22	19
95–99	..	..	..	..	..	..	..	..	3	2	..	19
No. of cases..	3	28	55	48	47	43	53	55	40	43	37	16

The data given in table 2 may be expressed in other ways. If we calculate the mental ages of the English-speaking group by means of the revised norms (p. 60) we may show clearly the relation of mental to chronological age. In table 3 mental ages of 5 and above indicate 4.6–5.5, 5.6–6.5, etc.

TABLE 3.—DISTRIBUTION OF PUPILS BY MENTAL AND BY CHRONOLOGICAL AGES

Mental age	Chronological Age												Number of cases
	4	5	6	7	8	9	10	11	12	13	14	15	
Below 4	1	3	2	1									7
4.0–4.5	1	2	2	1	1	..	..	..	..	..	..	..	7
5	1	15	13	6	3	1	..	..	..	..	..	..	39
6	..	6	16	5	4	..	..	..	..	..	..	..	31
7	..	2	16	16	8	2	..	..	..	1	..	..	45
8	..	..	5	15	13	5	3	2	..	..	..	..	43
9	..	..	1	4	14	11	9	7	1	1	1	..	49
10	..	..	..	..	4	11	15	12	5	..	1	1	49
11	..	..	..	..	..	4	13	15	3	3	2	..	40
12	..	..	..	..	..	7	3	10	4	4	2	..	30
13	..	..	..	..	..	1	4	3	6	3	4	2	23
14	..	..	..	..	..	1	5	2	2	5	8	4	27
15	..	..	..	..	..	..	..	..	3	6	1	1	11
16	..	..	..	..	..	..	1	2	4	3	6	3	19
17	..	..	..	..	..	..	..	..	4	9	3	..	16
18+	..	..	..	..	..	..	..	2	8	8	9	5	32
No. of cases.....	3	28	55	48	47	43	53	55	40	43	37	16	468

From this table it is evident that the scale is most accurate in the middle range. If we correlate the mental and chronological ages between chronological ages 6 and 12 inclusive, we find by the method of rank differences, that $r = .86$.

Some time after the original investigation was made, interest became aroused in the question of what scores on the separate tests could be expected for children of different mental ages. Foster and Taylor[1] worked over 316 of the original records, using approximately, though not exactly, the same group given in the previous table. They discarded records on test 6, since the form of that test had been changed and from the original scores it was impossible to predict what score would have been attained on the revised tests. The average scores which they find

[1] Foster, J. C. and Taylor, G. A.: The applicability of mental tests to persons over fifty years of age. *Journ. of Applied Psych.* 1920, 4, p. 139.

attained by children receiving different total scores are quoted in table 4.

TABLE 4.—AVERAGE SCORES BY TESTS FOR NORMAL SUBJECTS, CHRONOLOGICAL AGES 10-19

Test	Total score							
	46–52	53–60	61–66	67–71	72–75	76–79	80–82	83–100
1	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2	3.7	3.7	4.0	4.0	4.0	4.0	4.0	4.0
3	2.3	2.8	3.0	3.0	3.0	3.0	3.0	3.0
4	3.4	3.7	3.9	3.9	3.9	3.9	4.3	4.6
5	3.5	3.8	4.0	4.0	4.0	4.0	4.0	4.0
6	?	?	?	?	?	?	?	?
7	6.2	6.2	6.6	6.9	7.2	7.4	7.3	7.9
8	0.9	1.5	1.8	1.6	1.8	1.7	1.9	1.8
9	4.1	4.8	5.1	5.5	5.7	5.8	5.9	5.8
10	4.6	4.8	5.6	5.9	6.2	5.6	6.3	6.9
11	1.6	1.8	2.2	2.3	2.6	2.5	2.5	2.6
12	2.3	2.9	3.2	3.4	3.5	3.7	3.6	3.9
13	1.7	2.0	2.6	2.8	2.6	3.3	3.4	3.8
14	1.2	1.9	2.7	2.8	3.6	3.6	3.8	3.8
15	2.6	3.2	3.8	4.5	5.1	5.3	7.1	7.0
16	1.0	1.2	1.7	2.1	1.7	2.5	2.3	3.2
17	0.9	1.5	1.7	2.1	3.6	3.2	3.9	4.0
18	0.1	1.4	1.9	2.6	3.2	3.5	3.8	5.1
19	0.2	0.7	1.5	2.3	3.0	3.3	3.5	4.8
20	0.9	1.2	1.6	2.3	2.4	2.8	3.2	3.9

Dr. H. Egerton Brown, Psychiatrist in the Natal Education department, Mental Hospital, Pietermaritzburg, Union of South Africa, has supplied us with data on 377 English-speaking boys and 326 girls in a Natal Government School. These pupils were, for the most part, children of railway artisans and officials and there were none of the really poor. Records on subjects who were obviously feeble-minded or very retarded were discarded. Dr. Brown reports that the majority of the 8-year group fall between the ages of 8.0 and 8.5 and very few of them between 7.5 and 7.9. Table 5 gives the average scores attained by these boys and girls on the different tests.

TABLE 5.—AVERAGE SCORES BY TESTS, ENGLISH-SPEAKING BOYS IN A NATAL GOVERNMENT SCHOOL

	Chronological age								
	8	9	10	11	12	13	14	15	16
No. of cases	43	46	39	44	43	50	50	38	24
Test 1	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2	3.6	3.8	3.6	3.9	3.9	4.0	4.0	4.0	3.8
3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.9	3.0
4	3.7	3.8	3.9	4.0	4.0	4.2	4.2	3.9	4.2
5	3.5	3.7	4.0	3.9	4.0	4.0	4.0	4.0	4.0
6	2.0	2.3	2.4	3.2	2.8	3.5	3.7	3.6	3.7
7	6.1	6.3	6.5	6.3	6.9	7.0	7.6	7.5	7.5
8	1.6	1.5	1.9	1.8	1.8	1.8	1.9	1.8	1.9
9	5.0	5.3	5.3	5.9	5.9	5.8	6.0	6.0	6.0
10	5.4	5.3	5.6	5.8	6.3	6.9	6.8	6.5	7.0
11	1.9	2.2	2.1	2.0	2.0	2.2	2.3	2.1	2.0
12	3.1	3.3	3.3	3.6	3.7	3.7	3.8	3.8	4.0
13	1.6	2.0	2.7	3.1	3.3	3.5	3.7	3.7	3.7
14	0.7	1.0	1.4	2.0	2.7	2.8	3.0	2.5	3.0
15	3.5	3.9	4.2	5.5	5.6	6.1	6.5	6.5	7.3
16	1.6	2.0	2.8	3.0	2.9	3.1	3.5	3.4	3.5
17	1.4	1.7	2.3	2.6	2.8	3.6	4.0	3.6	4.0
18	0.2	0.4	1.9	2.4	2.5	3.9	4.0	4.7	4.0
19	0.7	0.8	1.5	2.1	2.3	3.2	3.6	4.5	4.3
20	0.7	1.1	1.6	2.2	2.5	3.0	3.4	3.5	3.7
Sum of av. scores..	52.2	56.4	63.0	66.3	71.9	78.3	82.0	81.5	83.6

TABLE 5.—(*Continued*)
AVERAGE SCORES BY TESTS, ENGLISH-SPEAKING GIRLS IN A NATAL GOVERNMENT SCHOOL

	Chronological age									
	6	7	8	9	10	11	12	13	14	15
No. of cases	22	30	48	39	36	43	30	36	23	19
Test 1	2.91	3.00	3.00	2.95	3.00	3.00	3.00	3.00	3.00	3.00
2	3.04	3.30	3.81	3.87	4.00	3.93	3.97	4.00	4.00	4.00
3	2.68	2.90	2.87	2.82	2.77	2.80	3.00	2.97	3.00	2.95
4	2.82	3.33	3.41	3.46	3.80	3.93	4.13	4.14	4.39	4.32
5	1.54	3.30	3.79	3.74	3.69	3.88	4.00	4.00	4.00	4.00
6	1.68	1.86	2.10	2.28	2.77	3.14	3.87	3.88	3.74	4.32
7	4.18	4.63	5.56	5.64	5.70	6.21	6.37	6.75	7.00	6.68
8	0.77	1.23	1.29	1.28	1.25	1.49	1.53	1.53	1.82	1.84
9	2.00	3.10	4.18	4.59	5.00	5.16	5.07	5.25	5.09	5.21
10	4.09	4.53	4.75	4.71	5.25	5.37	5.93	6.64	6.99	7.31
11	1.04	1.46	1.89	1.74	1.44	1.79	1.63	1.22	1.74	1.89
12	1.41	2.66	2.85	2.90	3.11	3.16	3.33	3.30	3.52	3.26
13	0.86	1.00	1.45	1.84	2.11	2.37	2.47	2.75	2.82	2.79
14	.....	0.13	0.75	1.38	1.88	1.90	2.06	2.11	2.60	2.10
15	1.72	2.03	2.62	3.33	4.08	4.44	4.70	5.77	5.91	6.16
16	0.86	1.46	1.71	1.97	2.22	2.58	2.67	3.16	3.56	3.58
17	0.45	1.30	2.08	2.33	2.63	3.53	3.93	4.28	4.35	4.53
18	0.18	0.13	0.78	1.28	2.44	4.23	4.46	5.72	5.82	6.00
19	0.09	0.26	0.78	0.90	1.38	1.90	2.60	3.05	4.26	4.21
20	0.27	0.66	1.35	1.56	2.64	3.60	4.20	4.77	5.04	5.47
Sum of av. scores.....	32.59	42.27	51.02	54.57	61.16	68.41	72.92	78.29	82.65	83.62

We have three sets of results upon normal children with which to compare these results of Brown: the original Point Scale English-speaking norms, the revised norms of Yerkes and Wood, and the norms used in the psychological examining in the United States army. Such comparison is given in table 6.

TABLE 6.—SUMMARY OF RESULTS OBTAINED UPON NORMAL CHILDREN. SCORE FOR EACH YEAR OF AGE

Age	Brown's data	Original norms	Revised norms	Army norms
8	52	41	41	41
9	56	56	49	50
10	62	62	57	58
11	67	65	64	64
12	72	77	70	70
13	78	79	74	74
14	82	81	78	78
15	82	82	81	81
16	84	?	84	84

Brown has explained the unusually large score obtained by his 8-year old children by saying that the majority of these cases fell in the six months above 8.0 and very few in the six months below. No explanation, however, is offered for the fact that the averages run consistently higher than the revised norms for the other ages in his group. Perhaps the fact that there were none of the "very poor," no obviously feeble-minded or "very retarded" included means that his group was superior to that from which the "revised norms" of table 6 were obtained.

For the psychological work in the United States army, a table of point scale norms was compiled to accord with the experience of a number of psychologists. These norms appear in table 7. They are recommended for use.

TABLE 7.—NORMS FOR USE WITH THE PRE-ADOLESCENT POINT SCALE (English-speaking)

Score	Mental age	Score	Mental age
15	4.0	52	9.3
16	4.1	53	9.4
17	4.3	54	9.5
18	4.4	55	9.6
19	4.6	56	9.8
20	4.7	57	9.9
21	4.9	58	10.0
22	5.0	59	10.2
23	5.2	60	10.3
24	5.3	61	10.5
25	5.5	62	10.7
26	5.7	63	10.8
27	5.8	64	11.0
28	6.0	65	11.2
29	6.1	66	11.3
30	6.3	67	11.5
31	6.4	68	11.7
32	6.6	69	11.8
33	6.7	70	12.0
34	6.9	71	12.3
35	7.0	72	12.5
36	7.2	73	12.8
37	7.3	74	13.0
38	7.5	75	13.2
39	7.7	76	13.4
40	7.8	77	13.6
41	8.0	78	13.9
42	8.1	79	14.2
43	8.2	80	14.5
44	8.3	81	14.9
45	8.4	82	15.3
46	8.6	83	15.7
47	8.7	84	16.1
48	8.8	85	16.5
49	8.9	86	17.0
50	9.0	87	17.5
51	9.1	88 to 100	18.0 or above

Several attempts have been made to express the "amount of scatter" in examinations in numerical terms. Curtis[1] suggests a "variation total" calculated from a table of expected scores which she presents. By using this method, normal children are found to vary less from the expected score for their mental age than other groups of subjects. Pressey[2] has used a somewhat different method for obtaining a table of expected scores and obtains slightly different results. One difficulty with both methods is that the higher the total score is, the less, roughly speaking, is the chance for variation. Probably some time we shall know what kind of failures are most significant and shall be able to weight them accordingly. Reference to this question of scatter and variability will be made again in the section on the examination of the insane.

NORMAL SCHOOL CHILDREN FROM NON-ENGLISH SPEAKING HOMES

In the original point scale examining one of the schools examined (School B) was located in a part of the city inhabited by foreign-born as well as by American-born individuals, and it was found that the two groups gave widely different results in the examination. The pupils were, therefore, divided into the children of English-speaking and those of non-English-speaking parents. The latter group includes 207 individuals. This classification was made irrespective of American or foreign birth, since in the English-speaking group were included many pupils born in Great Britain or her colonies, while in the non-English group, there appear many who were born in America in homes where other than English is spoken. Portuguese and Jewish children are the most numerous in the non-English group. The average scores attained by the English-speaking and non-English groups in School B together with the number of individuals in each language and age group appear in table 8. A given age group

[1] *Journ. of Abnormal Psych.*, 1918, 13, p. 88ff.

[2] Pressey, S. L.: *Journ. of Abn. Psych.*, 1917, 12, 130–139; 1918, 13, 314–323.

includes all individuals from the middle of the year below to the middle of the one above. Thus, in the group of four-year olds are included all from three years seven months to four years six months.

TABLE 8.—AVERAGE SCORES FOR ENGLISH AND NON-ENGLISH CHILDREN BY CHRONOLOGICAL AGES

Age	English		Non-English	
	Number of cases	Average score	Number of cases	Average score
4	3	17	2	11
5	28	22	11	21
6	55	29	16	27
7	48	35	25	31
8	47	41	14	37
9	43	56	31	48
10	53	62	23	56
11	55	65	24	62
12	40	77	20	67
13	43	79	17	68
14	37	81	15	75
15	16	82	9	71

It is not astonishing that the language difficulty should manifest itself in these averages, but it is somewhat surprising that the difference in the norms for the English-speaking and the non-English-speaking children should be so slight as 1 and 2 points, respectively, at the ages of 5 and 6. It is obvious that the differences at the extremes of our series, the fourth and fifteenth years, are unreliable because of the small number of individuals in the groups. In general, it appears that the non-English children fall short by 5 to 10 per cent. of the scores attained by their English-speaking companions. It is obviously unfair, then, to judge individuals from these two groups by the same standard, and in calculating the mental age of a child from a non-English speaking home, table 8 above should be used and the

mental age recorded as obtained from "non-English norms."

SUBNORMAL AND DELINQUENT CHILDREN

Since the publication of the first results with the Point Scale, most investigators naturally have been interested less in the accumulation of additional data on normal children than in the determination of the mental level of certain groups of children, particularly those suspected of mental inferiority. The result is that we have at hand a greater mass of results for subnormal, feeble-minded, and delinquent children than for unselected normal children. It is impossible here to cite these studies in detail, but we shall note the main results of a few investigations.

Dr. Bird T. Baldwin has been kind enough to supply us with data on 500 retarded Pennsylvania school children. The pupils in this group were selected by the teachers either as children suspected of feeble-mindedness or known to be seriously retarded. In some instances the teacher's judgment of feeble-mindedness was a mistake. The children are mostly from the lower level of the working class. We have here, then, a group near enough the normal to be in the public schools and yet sufficiently subnormal to attract the attention of their teachers.

Table 9 summarizes Dr. Baldwin's results for this group. The mental ages were calculated on the basis of table 8, p. 64 of the first edition of this book, substituting 76 for the 13-year score and 85 for the 15-year score. For the extremely high and extremely low mental ages there are so few cases that no conclusions can be drawn, but for ages 7 to 15 we have a distribution which enables us to say whether or not any slightly subnormal child varies greatly from what we would expect. When we compare this table with that of expected scores for normal children given by Curtis,[1] we find comparatively little difference in the distribution of scores for the two groups, and what difference there is might easily be explained by the fact

[1] *Journ. of Abn. Psych.*, 1918, 13, 89ff.

TABLE 9.—DISTRIBUTION OF SCORES ON SEPARATE TESTS BY MENTAL AGES
(Baldwin's subnormal group)

Points	Mental ages 3	4	5	6	7	8	9	10	11	12	13	14	15	16	Test no.
3	1	3	15	18	28	63	101	62	78	50	16	34	21	6	I
2	1		1	1											
1	1														
0															
4			6	13	23	51	93	60	78	50	16	33	21	6	II
3			2	3	4	8	6	2				1			
2			3	1	1	3	2								
1	1	1	1	1											
0	2	2	4	1		1									
3		2	14		26	61	99	61	76	49	16	34	21	6	III
2	2	1	1	16		2	2	1	2	1					
1			1	2	2										
0	1			1											
5					1	6	10	11	23	11	6	14	8	3	IV
4				3	2	14	28	21	29	26	3	11	8	3	
3			3	3	8	23	39	21	25	10	7	7	5		
2	1		12	8	16	19	24	9	1	3		2			
1	1	3	1	5	1	1									
0	1														

Points	Mental ages 3	4	5	6	7	8	9	10	11	12	13	14	15	16	Test no.
2		1	2	4	13	27	57	42	59	36	14	30	20	6	VIII
1	1	1	6	9	10	28	35	20	17	13	1	4	1		
0	2	1	8	6	5	8	9		2	1	1				
6						5	14	19	46	35	13	29	18	6	IX
5						8	34	33	24	12	2	4	3		
4				1	3	20	29	5	5	3	1	1			
3				1	2	11	18	5	3						
2				2	11	11	5								
1			8	8	10	8	1								
0	3	3	8		2										
8					1	9	21	30	44	36	13	29	18	6	X
7					2	4	19	13	23	5	1	3	2		
6					2	9	21	11	7	8	2	1	1		
5					4	11	25	6	4	1					
4		1	4	10	19	27	14	2							
3			1	4	3	3									
2			4	2			1								
1			3	2											
0	3	2	1	1											

Points	Mental ages 3	4	5	6	7	8	9	10	11	12	13	14	15	16	Test no.
8								1	4	3	9	10	5		XV
7							1		1						
6							2	3	15	22	8	14	5	1	
5							1	2	1	2	1	3	1		
4					2	8	38	29	41	14	4	8	5		
3				1	3	13	26	11	12	5					
2			3	6	13	28	27	16	7	2					
1				3	3	5	3								
0	3	3	13	9	7	9	5		1						
4						4	8	7	20	13	7	9	9	1	XVI
3						1	10	15	14	12	6	9	5	3	
2				1	5	17	24	19	46	17	2	7	5	1	
1					3	9	29	9	4	4	1	8	1		
0	3	3	16	18	20	32	30	12	8	4		1	1	1	
5										1		6	7	2	XVII
4									3	4	4	17	10	2	
3								3	10	14	3	5	1	1	
2							4	8	13	8	3	4	2		
1					1		5	12	15	14	3	2	1		
0	3	3	16	18	28	63	92	39	41	9	3			1	

4			1	1	3	38	87	58	78	50	16	34	19	6	V
3				3		3	2	3					2		
2			1	5	9	12	8	1							
1		2	2	2	1	3	2								
0	3	1	12	8	15	7	2								
6										3		2	1	3	VI
4							3	3	12	14	4	13	11	3	
2			8	14	21	57	91	58	64	33	12	19	9		
1		1	8	5	6	6	7	1	2						
0	3	2			1										
9					1	3	5	14	25	30	12	23	17	4	VII
8						6	10	11	19	8	3	8	4		
7				3	4	14	31	16	23	7	1			1	
6			1	5	16	24	48	20	11	5		2		1	
5		1	1	3	3	7	3	1							
4		1	3	1	3	4	3								
3	2		11	7	2	5	1								
2															
1															
0	1	1													
3			3	4	8	25	43	34	51	27	9	25	16	4	XI
2				5	4	9	25	18	13	11	4	4	2	1	
1			5	10	7	11	11	5	6	6	3	4	3	1	
0	3	3	8		9	18	17	5	8	6		1			
4			1	3	6	26	64	51	65	48	16	33	21	6	XII
3				5	4	18	26	6	10	1		1			
2	1		4	5	9	13	9	5	2	1					
1	1		7	4	6		1								
0	1	3	4	2	3				1						
4								6	12	14	2	18	13	5	XIII
3							13	9	14	13	9	7	5		
2				1	5	15	32	40	31	21	4	7	2	1	
1			3	5	5	21	42	20	19	2	1	1			
0	3	3	13	13	18	27	14	5	2			1	1		
4						3	10	14	37	23	8	19	13	4	XIV
2						13	38	32	35	23	7	14	8	2	
0	3	3	16	18	28	47	53	16	6	4	1	1			
6								1	9	12	6	17	20	6	XVIII
4							2	2	22	23	7	13	1		
2							3	6	10	8	1	2			
0	3	3	16	19	28	63	96	53	37	7	2	2			
6									1	2		3	6	6	XIX
4							2	1	5	11	3	12	8		
2							22	19	28	23	9	15	6		
0	3	3	16	19	28	63	79	42	44	14	4	4	1		
6												1	2	3	XX
5										2		2	3	2	
4							1	1	4	2	3	3	2		
3							1	3	5	8	2	4	4	1	
2							15	15	24	19	7	9	5		
1						15	48	26	42	17	3	15	5		
0	3	3	16	19	28	48	36	17	3	2	1				

that Curtis' table is arranged by chronological, while Baldwin's is arranged by mental age. A much greater difference between the data for mental and for chronological ages would, of course, be found in two groups whose mental ability was still more different.

In a like manner Dr. Baldwin has found the distribution of scores on the separate tests obtained by 400 delinquent white boys and an equal number of delinquent white girls. We thought that since most investigators agree that certain tests are easier and certain ones are harder for feeble-minded children than they are for normal children of the same mental age, we might find that the subnormals and the delinquents formed intermediate steps between the normals and the feeble-minded in this respect. We therefore combined Dr. Baldwin's 800 delinquent records with the records on 372 delinquent girls supplied us by Dr. John E. Anderson[1] and compared the average scores attained on the various tests by the same mental ages in the two groups. We found that, in general, the subnormal group was superior in tests 10 (simple definitions), 12 (copying square and diamond), and 16 (drawing designs from memory), while the delinquent group was superior in 17 (absurdities), 18 (dissected sentences), 19 (abstract definitions), and 20 (analogies). This is a comparison, however, of groups that differ not merely in amount of intelligence, or even in that plus traits leading to delinquency, but also in chronological age. We shall find later that the ability to pass certain of the tests of the Point Scale varies greatly with chronological age, and the list of tests which we find as easy or hard for the delinquents as compared with the subnormal group is really a mixture of those tests which are easy or hard for the feeble-minded and those tests which are easy or hard for older subjects. This same difficulty is without a doubt a great factor in the discrepancies which are found between statements of

[1] That we were not confusing the issue by combining groups of different grades may be shown by the fact that the average mental age of Dr. Baldwin's group is 11.8 while that of Dr. Anderson's group is 11.9.

different investigators as to the tests which are easy and hard for the feeble-minded. Perhaps if we could limit the groups of feeble-minded used in the different studies to those of the same chronological ages, we might get always the same list of "easy and hard tests."

The feeble-minded give, of course, lower mental ages than the normals or than the groups of subnormals and delinquents which we have cited. One investigation which included all the "high-grade" children at the Massachusetts School for the Feeble-minded at Waverley,[1] found the average mental age (calculated by the norms used by Baldwin above) of this high-grade group to be 9.95. The average mental age for the entire school would, of course, be a great deal lower. For this group, the tests which proved to be unusually easy were 7 (interpretation of pictures), 12 (copying square and diamond), and 15 (comprehension of questions), while those which were unusually difficult were 9 (comparison of objects), 13 (free association), and 14 (three words in one sentence).

THE INSANE

The Point Scale is particularly well adapted for use in cases where the question of abnormality is important, that is, where we are interested not so much in the quantitative results, score or mental age, but in the qualitative results as well, that is, in what particular kinds of tests are passed or failed in attaining the total score and with what degree of satisfactoriness.

Curtis[2] has compared the scores in the different tests for various psychoses with the scores expected from normal children of the same mental age. Her table showing the distribution of these differences on the different tests ("variation total") is here reproduced in condensed form as table 10. The group called "not psychotic" includes subjects who had been sent to the Psychopathic Hospital on the suspicion that they might be psychotic, but in

[1] Curtis, J. N.: *Journ. of Abn. Psych.*, 1918, 13, 77.

[2] *Journ. of Abn. Psych.*, 1918, 13, 92ff.

whom the psychiatrists could find no mental disease. From the group labelled "all psychoses" have been excluded all cases of psychopathic personality, manic-depressive insanity, hysteria, and psychoneurosis because these cases are in general so near the normal in intelligence.

TABLE 10.—DISTRIBUTION OF VARIATION TOTALS FOR VARIOUS GROUPS OF SUBJECTS

Variation total	Diagnosis					
	Normal	Not psychotic	Feeble minded	Dementia praecox	Alcoholic psychoses	All psychoses
0–4	109	25	26	6	3	17
5–9	305	83	188	23	7	85
10–14	82	31	137	16	22	72
15–19	6	6	25	6	7	31
20–24	1	...	4	2	3	10
25–29	...	1	...	1	1	2
Number of cases....	503	146	380	54	43	217

The average variation totals and the probable correctness of the differences between the larger groups are given as:

Normals	Average	6.8	P. E. 2.03
Not psychotic		7.6	2.44
Feeble-minded		9.2	2.40
Grouped psychoses		10.6	3.22

Probable correctness of differences between:

Normal and not psychotic	0.57
Normal and feeble-minded	0.70
Normal and psychotic	0.75
Feeble-minded and psychotic	0.62
Feeble-minded and not psychotic	0.62
Psychotic and not psychotic	0.69

In her discussion of these tables, Curtis concludes[1] that: "The alcoholic psychoses give by far the highest variation total. This high value is probably not a symptom of alcoholic psychosis itself, but rather of advancement of

[1] P. 20.

deterioration or depth of psychosis. Many persons, doubtless, would expect the dementia praecox patients to show greater variability than the alcoholics, and in the majority of hospitals for the insane this would probably be true, but in the Psychopathic Hospital in Boston we have rather a selected group . . . The (dementia praecox) group find their way into institutions comparatively early in life. They show hallucinations and delusions, etc., before they have deteriorated markedly and so, by the time they are greatly deteriorated they are already in a state asylum and not likely to enter a "clearing house" like the Psychopathic. Our dementia praecox cases, then, will be little deteriorated and, unless decidedly schizophrenic, will not show large variations. The cases of alcoholic psychoses, on the contrary, do not come into the hospital until they are older and until their psychosis has begun to interfere definitely with their work. Besides the initial selection there is a further selection in the cases which are referred for psychological examination. The great majority of patients under age 25 are sent for this examination. This includes a great many cases of beginning dementia praecox, and practically none of beginning alcoholic psychosis. Of the more advanced cases, the alcoholics are more accessible and so if the problem is one of degree of deterioration, a deteriorated alcoholic will, in general, co-operate better than a deteriorated dementia praecox. This means that more deteriorated alcoholics will be referred to the psychological department and that of those referred we shall be able to use the records of a greater per cent. of alcoholics than of dementia praecox. The above discussion may be interpreted to mean that we may expect larger variations from cases of psychosis of long standing . . . On the whole the outstanding feature of our table is that normals and 'not psychotic' subjects give smaller 'variation totals' than do the feeble-minded, and that the feeble-minded give smaller 'variation totals' than do the deteriorated or the markedly psychotic patients."

We find, then, that there are decided differences between the examinations given by psychotics and by normals of the same mental age. It is to be regretted that at the time the above data were collected, chronological age was not taken into account. It seems certain, in the light of later researches, that many of the "variation totals" would be altered if the chronological age as well as the mental were kept constant for the groups.

Not only is the general variability from the expected score (or the "amount of scatter") important, but the performance on some of the individual tests is of the greatest significance. Foster[1] has worked over considerable data on the scores obtained on tests of memory by various groups. There are three memory tests in the Pre-adolescent Point Scale, memory span for digits, memory for sentences, and memory for designs. Of these, test 6 (repetition of sentences) is poorly arranged for discrimination between subjects, since very few fail in the first two sentences, and very few pass the last one, so that the question narrows down to whether some can or can not give the third (next to the longest) sentence. The scores for this third sentence show no regularity.

In investigating the relationship of memory span for digits to diagnosis, it was found that "with all patients, whatever the diagnosis, memory span increases with advancing mental age; but the increase is so slight after mental age 10 we can show it only by keeping a decimal place. In general, we may say not only for all mental ages over 10 we may expect a memory span of six or seven digits, but also that one of only five digits is not unusual. When the cases with different diagnoses are grouped by chronological ages, again we find no significant differences. For example, for the four decades, from ten to forty-nine, our 'not insane' cases give averages of 6.4, 6.5, 6.6, and 6.3 while dementia praecox patients give 5.3, 6.0, 5.3 and 5.7. Similarly patients suffering from other diseases show no regular change in the memory span with advancing chrono-

[1] *Journ. of Applied Psych.*, 1920, 4, 142–154.

logical age. That the diagnosis itself has little or no relation to the memory span may be seen from the fact that if we use only those cases where the mental age is 11.5 or over, so that we surely get no influence of mental age, we find the average number of digits to be: subjects suffering from dementia praecox, 5.8; from alcoholic psychoses, 5.9; from unclassified paranoid condition, 5.9; from manic-depressive psychoses, 6.1; those 'not insane,' 6.5; and the

TABLE 11.—CASES USED IN DISCUSSION OF MEMORY DRAWINGS

Number of cases	Diagnosis	Average Point Scale Score	Average Chronological age
72	"Not Insane"	80.0	18.8
183	Feeble-minded	59.7	21.5
121	Dementia praecox	62.7	32.1
23	Syphilitic psychoses	64.3	41.5
14	Unclassified paranoid condition	73.7	48.0
42	Acute alcoholic psychoses	75.4	38.5
20	Deteriorating alcoholic psychoses	76.2	49.6
35	Manic-depressive psychoses	72.1	44.1
13	Arterio-sclerotic psychoses	55.0	61.3
10	Senile dementia	54.6	68.3

TABLE 12.—AVERAGE SCORE ON MEMORY DRAWINGS FOR DIFFERENT DIAGNOSES AT DIFFERENT MENTAL AGES
(Highest possible score is 4)

Diagnosis	Mental age						
	7–8	9–10	11–12	13–14	15–16	17–18	18+
Normal children	0.5	1.1	1.8	2.2	2.7	3.0	3.4
"Not insane"	...	0.5	1.9	2.8	2.8	3.0	3.3
Feeble-minded	0.8	1.8	2.1	2.7			
Dementia praecox	...	0.5	0.9	1.8	2.1	1.6	3.0
Acute alcoholic psychoses	...	0.4	0.8	0.7	1.4	...	2.3
Manic-depressive	...	0.6	1.2	1.0	...	...	1.5
All hospital cases	0.5	1.2	1.3	1.8	2.3	1.8	2.7

feeble-minded, 6.8. The greatest difference, 1.0, is too small to be considered significant in view of the small number of cases and the possible selective factors involved."

When we come to the discussion of the drawings from memory, however, we find quite a different state of affairs. Tables 11, 12 and 13 are reproduced from Foster's article.[1]

TABLE 13.—AVERAGE SCORE ON MEMORY DRAWINGS FOR DIFFERENT DIAGNOSES AT DIFFERENT CHRONOLOGICAL AGES
(Highest Possible Score is 4)

Diagnosis	Chronological age						
	10–19	20–29	30–39	40–49	50–59	60–69	70–79
"Not insane"	2.9	2.9					
Feeble-minded	2.2	1.6	1.1				
Dementia praecox	1.4	1.6	2.0	0.9	0.7	0.0	
Syphilitic psychoses	...	0.9	0.0	0.6			
Deteriorating alcoholic	...	...	...	1.8	0.3		
Acute alcoholic	...	1.6	1.8	0.9			
Manic-depressive	...	2.0	1.2	2.0	0.6	0.5	
All hospital cases	2.3	1.7	1.4	1.1	0.6	0.2	0.1

From tables 12 and 13 "it appears that the insane are well below normal children, 'not insane' and feeble-minded of the same mental ages, but that scores tend to increase with advancing mental age. When we group our cases by chronological ages we find, on the contrary, that the average score tends to drop off with advancing age, at least after age 40 . . .

"From the two tables just given we see that although cases with all diagnoses show increase in score on memory drawings with increase in mental age, and decrease in score with increase in chronological age after age twenty or thirty, there are, nevertheless, decided differences from diagnosis to diagnosis as to the exact age at which the change begins or is most marked. When we come to the question of the disease itself, it is therefore necessary to

[1] *Journ. of Applied Psych.*, 1920, 4, p. 144.

reduce as far as possible the influence of mental and chronological age. In order to do this, we have discarded those cases with mental ages below 11.5. This means that we have also eliminated practically all cases with chronological ages of 50 or more, for none of our older patients received high scores on the Point Scale. With such limitations we find the average scores on the test to be: cases diagnosed as 'not insane,' 2.9; normal children, 2.7; cases diagnosed as feeble-minded, 2.7; as dementia praecox, 2.1; as manic-depressive, 1.5; as acute alcoholic psychoses, 1.5; as deteriorating alcoholic psychoses, 1.4; as syphilitic, psychoses 1.2; as unclassified paranoid condition, .8; and of those diagnosed as arterio-sclerotic psychoses and senile dementia, there were too few cases. If further restriction is made by discarding all cases with chronological ages of over 30 we get the same order of diagnoses for the first six groups. The other groups drop out. The mean variations for these averages are all about .9.

"In the score for the drawings from memory, therefore, we find, a point at which the psychological examiner should be on the lookout for inconsistencies. Realizing that a high score is to be expected from young persons and from persons with a high mental age, the examiner should note any case where low chronological age and high mental age are combined with poor performance in the memory drawings.

"Not only is the score on the memory drawings important, but the shape and size of the drawing itself may be indicative of mental disease. A drawing which receives no credit may be as significant as the one which adds to the total score. If we take the drawings which were not given any credit, we may arrange them in the following groups . . . those giving the general idea . . . those giving sketchy drawings (including also those who made no attempt, and those who omitted lines), and those giving elaborated drawings (including also those whose drawings showed no resemblance to the original). Our data give no evidence that mental age and chronological age have any

influence upon the type of memory drawing. The cases with the different diagnoses, however, give rather typical results. When we consider only those cases with mental ages of 11.5 or more (so that any influence of chronological age is even more certainly eliminated) we find those inclined to elaborate or fabricate in the drawings to be those suffering from syphilitic psychoses (43 per cent. elaborated *vs.* 0 per cent. who give scanty drawings); from dementia praecox (24 per cent. elaborated *vs.* 12 per cent. scanty); and from unclassified paranoid condition (40 per cent. *vs.* 30 per cent.). On the other hand, those tending to give scanty or sketchy drawings are: those suffering from deteriorating alcoholic psychoses (33 per cent. scanty *vs.* 0 per cent. elaborated); and the feeble-minded (19 per cent. scanty *vs.* 5 per cent. elaborated). The cases diagnosed as "not insane" give less than 10 per cent. in either scanty or elaborated drawings." (Illustrations of such drawings are given at the end of this book in figure 22 taken from the article here quoted.) Figure 22 (*a*) "shows a sketchy drawing of the 'box' made by a case of senile dementia, chronological age 75, mental age 7.5. Figure (*b*) shows a slightly elaborated drawing of the first figure made by a case of dementia praecox, chronological age 22, mental age 11.2. Figure (*c*) shows practically no resemblance to the original 'box' which the patient, a case of general paresis, chronological age 50, mental age 8.9, was attempting to reproduce. The other figures in the plate are reproductions of the second memory drawing. Figure (*d*) was made by a case of manic-depressive insanity, chronological age 30, mental age 18.0 and belongs, of course, to the 'scanty' type. Figures (*e*) and (*f*) are examples of elaboration and were given by a case of dementia praecox, chronological age 18, mental age 13.5 and by a case of general paresis, chronological age 30, mental age 11.6. Figure (*g*) shows an entirely fanciful reproduction by a case of general paresis, chronological age 41, mental age 8.9.

"Our main conclusions considering all computation of results on both drawings, individually and together, cases

with mental ages of 11.5 or over, and all mental ages together, types of drawings as originally separated, and as grouped together, are these: Patients suffering from syphilitic psychoses, dementia praecox, and unclassified paranoid condition tend to elaborate the original drawing, or to make some fanciful combination of lines having little or no relation to the original. Cases of arterio-sclerotic psychoses and senile dementia are apt to fail to attempt the drawings at all. Cases of manic-depressive insanity, arterio-sclerotic psychoses and senile dementia are apt to omit lines. The feeble-minded omit lines more often than they add them.

"The size of the drawing from memory is probably also of significance. Patients are not instructed to reproduce the drawings in any special size, though the size is roughly limited by the dimensions of the record sheet (10.5 in. by 7.5 in.). If a patient asks 'Shall I make it just the same size as the one I saw?' he is told 'Why, yes. Just about. You need not be too fussy.' Very few patients ask. We shall confine ourselves to the discussion of the first drawing, since it is much the easier to measure, and we have observed that increase or decrease in the one drawing tends to carry over to another. The height of the original drawing is 4.4 cm. Our records give no evidence that mental and chronological age have any influence on the size of the drawings from memory. The average heights of the drawings given by patients are: those diagnosed as 'not insane,' the feeble-minded, and those suffering from deteriorating alcoholic psychoses, each 3.8; those suffering from manic-depressive insanity, 4.1; from acute alcoholic psychoses, and from senile dementia, each 4.2; from arterio-sclerotic psychoses, and from unclassified paranoid condition, each 4.3; from dementia praecox, 4.4; and from syphilitic psychoses, 5.3. (The mean variations of all these averages are about 1.0.) Similarly, if we consider the percentage of cases giving extremely large or extremely small drawings, we find that the cases of syphilitic psychoses, of unclassified paranoid condition, and of dementia praecox tend to exaggerate the size; while the feeble-minded and the cases of manic-

depressive and alcoholic psychoses tend to diminish the size. These groups are the same that we found in the discussion of the 'types' of the drawings. Thus, roughly speaking, paucity of detail and relative smallness of size are found in one group of diagnoses, elaboration of detail and largeness of size in another group.

"We may summarize our discussion of the drawings from memory as follows: The psychologist should note: (1) a low score on the drawings from memory combined with a comparatively low chronological age and a high mental age; (2) elaborated or fanciful drawings; and (3) very large drawings."

Such work as this done on test 16 should be carried on for other types of test. We might, for example, expect that the manic-depressive-manic patients would give many words in three minutes, while the depressed patients would give few.

THE INFLUENCE OF CHRONOLOGICAL AGE

It has long been realized that elderly persons are less acute than adolescents and in general less adaptable to novel situations. Foster and Taylor[1] used the Point Scale to investigate the differences between psychotic and normal cases over fifty years of age, and incidentally to compare, as well as their data permitted, normal young persons with normal older persons. They conclude that the older psychotic persons do show a lower intelligence rating than their normal contemporaries. Since the psychotic persons studied also have, if anything, a higher social rating, we must conclude that this greater deterioration is due to the progress of mental disease. If we consider the different mental diseases separately and compare the results for each with the average attainments of normal older persons, we find that dementia praecox, senile dementia, and arterio-sclerotic persons differ most from normal persons of their age, while manic-depressive and unclassified paranoid cases differ least.

[1] Op. cit.

The results for normal persons over fifty years of age and of relatively low social status are given in table 14.

TABLE 14.—AVERAGE POINT SCALE SCORES OF OLDER NORMAL PERSONS

Chronological age,	50–59	60–69	70–79	80–89
Number of cases	55	34	13	4
Test				
1	3.0	3.0	3.0	3.0
2	3.8	3.7	3.7	3.0
3	2.9	2.9	2.9	3.0
4	3.8	3.3	3.3	3.5
5	3.8	3.7	3.7	3.3
6	4.1	3.9	3.4	3.0
7	7.8	7.3	7.2	8.0
8	1.8	1.8	1.6	2.0
9	5.5	5.6	5.2	3.0
10	5.9	5.6	5.0	4.0
11	2.6	2.5	2.3	1.8
12	3.7	3.1	3.4	3.3
13	1.6	1.9	0.8	1.8
14	1.3	1.0	0.7	0.5
15	6.7	5.8	5.5	4.8
16	0.9	0.3	0.1	0.0
17	3.4	2.9	3.1	2.3
18	2.6	2.3	0.7	0.5
19	4.4	3.5	2.9	1.5
20	2.3	2.2	1.3	1.0
Total score.....	71.9	66.3	59.8	53.3

From this table it appears that in general the total score falls off with advancing chronological age. The small number of cases in the highest age-group make the average scores unreliable. When we consider the age-groups 50–59, 60–69, and 70–79 we find that not only does the total score fall off, but that there is a well defined tendency for the score in each test to fall off. This tendency is particularly marked in tests 16 (drawings from memory), 18 (dissected sentences), 14 (three words in one sentence), and 13 (words in three minutes). It is least marked, on the other hand, in the very easy tests 1, 2, 3, and 5 (aesthe-

tic comparison, missing parts, comparison of lines and weights, and counting backwards), and in test 17 (absurdities).

Table 15 summarizes the results for three groups of normal subjects. The youngest of these is a group of Cambridge public school children between the ages of 10 and 19 who were tested in obtaining the original norms for the Point Scale. The next group consists of 482[1] young men between the ages 20 and 30. This group is distinctly inferior in social status and education. Approximately 80 per cent. are manual laborers, between 60 and 70 per cent. of them left school before reaching the 5th grade and over 90 per cent. left before reaching the 9th. The oldest of these groups consists of 106 patients 50 or more years of age in a large general hospital in Boston. Of this group 76 per cent. are men; 59 per cent. are manual laborers; 32 per cent. left school before the 5th grade, and 85 per cent. left before the 9th. The average social status of this group is, therefore, relatively low, although certainly higher than that of the group of young men.

No grade could be given to the school children in test 6 because the form of this test has been changed since they took the examination. Neither could any grade be given the young men in the Foster-Taylor group in tests 14 and 18 since so many of them were illiterate that these tests were omitted. Allowance for these omissions has been made in the calculation of total scores given in the column at the left. The averages for the young men in tests 14 and 18 are based upon Anderson's figures alone. In the last section of the table we follow Foster and Taylor in giving the averages of the eight total-score groups. "This is, to be sure, an 'average of averages.' Even so, it is more significant than would be an average of the original scores. In the first place, we could not use the simple average of scores obtained on each test by each of our age-groups

[1] To the records of the 315 young men which Foster and Taylor published we have added records of 167 others of approximately the same age and social status, furnished us by Dr. John E. Anderson.

because there were so many more high scores among the younger that they would have appeared to too great an advantage. We, therefore, divided our cases in groups by total score attained. The averages for these groups may then be treated as if they had been 'corrected' and as if there were an equal number in each total score group, and our 'average of averages' is, then, the average score attained on each test by each age group, supposing the distribution of total scores for the age-groups to be the same.[1]

From table 15 it appears that tests 13 (words in three minutes), 14 (three words in one sentence), 16 (drawings from memory), and 18 (dissected sentences) all show a marked falling off in score as the chronological age increases. This is most marked in test 16 (drawings from memory). On the other hand, tests 15 (comprehension of questions), 17 (absurdities), and 19 (definition of abstract terms) show an increase in score with increased age. "From the results we may conclude that the improvement in ability to comprehend questions comes fairly early, since our young men are so far superior to the school children and are practically the same as the older persons. The improvement in . . . definitions of abstract terms, on the other hand, seems fairly regular. The falling-off in giving words in three minutes seems regular, but in drawings from memory, the score does not show any decided decrease until late, that is, the young men differ but little from the school children, while the older persons are decidedly inferior to the young men.[2]

"The above data show with reasonable certainty that there are decided changes in the distribution of abilities (as shown by the Point Scale) as persons get older. These changes appear whether we compare the insane or the normal, whether we lump all our cases together or fractionate them by particular disease, whether we compare the very old with the very young, or whether we compare the middle-aged with young adults. The only condition that must be observed is this one: that only those whose total

[1] Loc. cit., p. 48. [2] Loc. cit., p. 49.

TABLE 15.—AVERAGE POINT SCALE SCORES FOR NORMAL SUBJECTS OF THREE AGE GROUPS

Total score	Chronological age	Test																			Number of cases
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
46–52	10–19	3.0	3.7	2.3	3.4	3.5	?	6.2	0.9	4.1	4.6	1.6	2.3	1.7	1.2	2.6	1.0	0.9	0.1	0.2	0.9	45
	20–29	2.8	3.5	2.8	2.5	3.0	2.4	5.0	1.5	4.8	4.5	1.9	3.3	1.0	0.0	4.1	1.0	1.6	0.0	0.9	1.2	40
	50–84	2.8	3.6	3.0	3.8	3.2	2.4	6.2	2.0	4.8	5.0	2.6	2.8	0.4	0.0	3.4	0.0	0.0	0.0	2.4	0.2	5
53–60	10–19	3.0	3.7	2.8	3.7	3.8	?	8.2	1.5	4.8	4.8	1.8	2.9	2.0	1.9	3.2	1.2	1.5	1.4	0.7	1.2	61
	20–29	3.0	3.7	2.9	2.7	3.7	2.7	6.1	1.6	5.2	5.0	2.1	3.1	1.9	0.5	5.0	1.2	2.1	0.3	1.9	1.2	106
	50–84	3.0	3.4	2.8	3.3	3.7	3.8	6.6	1.7	4.7	5.1	2.4	3.4	0.7	0.0	4.4	0.0	1.9	0.1	2.9	0.8	9
61–66	10–19	3.0	4.0	3.0	3.9	4.0	?	6.6	1.8	5.1	5.6	2.2	3.2	2.6	2.7	3.8	1.7	1.7	1.9	1.5	1.6	39
	20–29	3.0	3.8	3.0	3.1	3.9	3.0	6.8	1.8	5.5	5.5	2.5	3.4	1.7	0.8	5.3	1.4	2.1	0.9	2.6	1.2	124
	50–84	3.0	3.6	2.8	3.1	3.7	2.8	7.5	1.7	5.2	5.5	2.8	3.6	0.8	1.1	5.1	0.2	2.3	1.3	3.5	1.2	13
67–71	10–19	3.0	4.0	3.0	3.9	4.0	?	6.9	1.5	5.5	5.9	2.3	3.4	2.8	2.8	4.5	2.1	2.1	2.6	2.3	2.3	31
	20–29	3.0	3.8	3.0	3.6	3.9	3.3	6.7	1.9	5.4	5.5	2.5	3.6	1.8	1.3	5.3	2.2	2.9	1.5	2.9	1.7	68
	50–84	3.0	3.7	2.9	3.4	4.0	4.9	7.6	1.7	5.6	5.0	2.6	3.6	2.0	0.7	6.0	0.7	3.6	1.3	2.3	2.0	7
72–75	10–19	3.0	4.0	3.0	3.9	4.0	?	7.2	1.8	5.7	6.2	2.6	3.5	2.6	3.6	5.1	1.7	3.6	3.2	2.0	3.4	21
	20–29	3.0	3.9	3.0	3.7	3.9	4.4	6.7	1.9	5.6	6.2	2.7	3.7	2.5	1.7	5.9	1.7	3.2	2.6	3.0	2.5	40
	50–84	3.0	3.6	3.0	3.8	4.0	5.0	7.5	1.5	5.9	5.6	2.6	3.9	2.3	1.2	6.6	0.3	3.5	2.0	3.0	2.5	8
76–79	10–19	3.0	4.0	3.0	3.9	4.0	?	7.4	1.7	5.8	2.5	3.7	3.3	3.6	5.3	2.5	3.2	3.5	3.5	3.3	2.8	31
	20–29	3.0	3.9	3.0	3.2	3.9	4.1	7.1	1.9	5.5	5.9	2.4	3.6	2.5	3.2	7.1	1.9	3.8	3.6	3.9	2.5	41
	50–84	3.0	3.8	3.0	3.6	4.0	5.6	8.2	2.0	5.4	5.2	3.0	4.0	1.6	1.5	6.8	0.6	4.4	4.0	4.4	1.8	5
80–82	10-19	3.0	4.0	3.0	4.3	4.0	?	7.3	1.9	5.9	6.3	2.5	3.6	3.4	3.8	7.1	2.3	3.9	3.8	3.5	3.2	19
	20–29	3.0	4.0	3.0	3.8	4.0	3.7	7.8	2.0	5.4	6.4	2.5	3.5	2.4	3.3	7.3	2.7	4.0	3.7	4.7	2.8	29
	50–84	3.0	3.8	2.9	3.8	4.0	4.8	8.5	1.5	5.8	6.3	2.5	3.7	1.9	2.7	7.8	0.3	4.3	3.1	4.8	2.8	13
83–100	10–19	3.0	4.0	3.0	4.6	4.0	?	7.9	1.8	5.8	6.9	2.6	3.9	3.8	3.8	7.0	3.2	4.0	5.1	4.8	3.9	69
	20–29	3.0	3.9	3.0	4.4	4.0	4.9	8.0	1.8	5.6	7.0	2.7	3.8	3.5	3.7	7.0	3.5	4.5	4.9	5.0	4.0	29
	50–84	3.0	4.0	3.0	4.3	4.0	4.5	8.1	2.0	6.0	7.1	2.8	3.7	2.5	2.8	7.9	2.1	4.8	4.9	5.8	4.6	17
Average for the above eight groups																						
45–100	10–19	3.0	3.9	2.9	4.0	3.9	?	7.2	1.6	5.3	5.8	2.3	3.3	2.8	2.9	4.8	2.0	2.6	2.7	2.4	2.3	316
	20–29	3.0	3.8	3.0	3.4	3.8	3.7	6.8	1.8	5.4	5.8	2.4	3.5	2.2	1.8	5.9	1.9	3.0	2.2	3.1	2.1	482
	50–84	3.0	3.7	2.9	3.6	3.8	4.2	7.5	1.8	5.4	5.6	2.7	3.6	1.5	1.3	5.8	0.5	3.1	2.1	3.6	2.0	77

score, or general level of intelligence, is approximately the same may be reliably compared. If we do not make this restriction, the young will be found to excel in each test as well as in total score."[1]

The differences between the results given by old and by young normal persons are so striking that we must conclude that it is unfair to try to determine an elderly person's mental rating by examining him with questions designed for adolescents. In the absence of an intelligence examination constructed for and standardized upon persons over fifty years of age, our only just procedure is to drop from the adolescent scale those tests which prove unsuitable for use with the older subjects, and make some adjustment in the total score of this abbreviated scale so that a mental age of 10 when applied to an old person places him in the same group as far as intelligence goes, with a young person of mental age 10. That is, it is important to know two things in regard to older persons: first, how they compare with their own previous record (this can be determined from using the usual Pre-adolescent Point Scale): and second, how they compare with their normal contemporaries (this can be determined by omitting certain point scale tests and then "correcting" the total score).

The method of "correcting" total scores is perhaps most easily understood from the discussion given by Foster and Taylor[2] which we quote here in full.

"Already at this (the Boston Psychopathic) hospital we had been in the habit of making allowance for the omission of certain tests and we now applied the same method to a scheme for discounting the effect of advancing years. Perhaps it will be as well to give the history of the previous work, so that the present calculations will not seem too fanciful. To be sure, the plan we are about to present has obvious faults and we can claim for it no more than fairly satisfactory results. We give it here in the hope that the idea will lead some others to similar work and will in the end result in an accurate and theoretically correct table.

[1] Loc. cit., p. 53. [2] Loc. cit., p. 55ff.

"The first problem of the kind which arose was the question of how to grade patients who were totally deaf and who, therefore, could not be given tests 4 and 6 (auditory memory span for digits and sentences). Our procedure at first was to add the scores with these tests omitted, call that the minimum mental age, then add to that the highest score obtainable on the two omitted tests, call that the maximum mental age, and then say that the true mental age lay somewhere between those two limits. This was fairly satisfactory, but we thought it possible to get a more accurate statement. This we computed from our table of scores for each test which were to be expected for different ranges of total score. From the table[1] we calculated the amount of credit to be expected on tests 4 and 6 for each of the ranges of total score. We then constructed a table giving the amount that should be added for each total score obtained when the two tests were omitted. We later made similar tables of corrections for omission of tests 14 and 18 (lack of education) and for tests 1, 2, 3, (*a*), 7, 11, 12, 16, and 18 (total blindness). The corrections for lack of education were adopted by the Division of Psychology in the Surgeon General's Office for use in the examination of illiterates. The corrections are given in table 16.

"With these tables as models, we proceeded to make a similar table to correct for advanced chronological age. We have found throughout, as we have said, that the older subjects are almost without exception poorer in tests 13, 14, 16, and 18 than younger persons attaining the same total score. We have therefore supposed that these tests should be omitted in giving the examination to old people and have calculated the corrections for such omission. We do not mean that the tests should actually be omitted. On the contrary, if a person of over 50 years obtains a high score on the four tests, it is evident that he has not begun to lose certain abilities which many of his contemporaries have lost. In other words, in our opinion

[1] This table was published with some printer's errors (later corrected) in the *Journ. of Abn. Psych.*, 13, 1918, p. 77.

TABLE 16.—CORRECTIONS FOR POINT SCALE NORMS WHEN CERTAIN TESTS ARE OMITTED

When 4 and 6 are omitted (deafness)		When 14 and 18 are omitted (education)		When 1, 2, 3(*a*), 7, 11, 12, 16, and 18 are omitted (total blindness)	
For scores	Add	For scores	Add	For scores	Add
13–25	5	18–51	0	7–13	11
26–60	6	52–58	2	14–15	15
61–78	7	59–62	4	16–21	16
79	8	63–69	6	22–28	17
80–91	9	70–74	8	29–34	18
		75–77	9	35–39	21
		78–90	10	40–42	24
				43–48	27
				49–50	29
				51–52	30
				53	32
				54	33
				55–66	34

failure on tests 13, 14, 16 and 18 on the Point Scale means little or nothing if the subject is advanced in years, while success on those tests may be very significant. The corrections which we offer tentatively for this group of advanced ages are given in table 17.

TABLE 17.—CORRECTIONS FOR POINT SCALE NORMS TO BE USED WITH OLDER SUBJECTS

When tests 13, 14, 16 and 18 are omitted
(Advanced Chronological Age)

FOR SCORES:	ADD:
18–36	0
37–43	1
44–48	3
49–53	5
54–55	9
56–58	12
59–61	13
62–66	15
67–69	17
70–82	18

"At first thought it may appear that if we correct for failures which seem to be due to advanced age alone, we should also correct for successes which are apparently due to the same cause. Perhaps we should. If the idea were carried to its logical extreme we would be correcting for every test except 1 and 20, the only ones in which the average score for young and old is identical. Such a procedure would, of course, be meaningless, and would amount to giving a mental age on the basis of two tests alone. Somewhere, then, we must draw the line between no correction and total correction. We considered at first correcting for those tests in which one age gave an average score which was 120 per cent. of the score obtained by the other age. This limit, however, would make us correct for 8 tests, in five of which the younger and in three of which the older were superior. Eight seemed such a large percentage of the total number of tests, 20, that we were afraid we were again basing mental age on too few tests. If the limit were raised to 200 per cent., we would be correcting for only three tests, 13, 14, and 16. Test 18 which came next on the list with the younger excelling the older by 136 per cent. was later included because the test is one which many of the older subjects like, and which often they cannot see to read. The actual limit used was, therefore, 136 per cent."

THE INFLUENCE OF SOCIAL STATUS

In the original point scale investigation, examinations were made in two very different schools; School A and School B. School A was located in a good neighborhood and the sociological status of almost all the pupils was good to excellent. With few exceptions, these individuals were American-born as well as of English-speaking parentage. School B, on the contrary, was located in a medium to poor region of the city, and the majority of its pupils lived in a medium to poor environment.

Unfortunately it was possible to examine in School A only the pupils of the kindergarten and the first grade, and we have, therefore, for contrast with children of approximately the same age in School B only 54 individuals.

Since practically all the pupils of the favored group, as we may call that of School A, were born of English-speaking parents, it is obvious that they should be compared with the children of the English-speaking group of School B.

Table 18 gives the average scores for pupils of different ages in the two groups. We have here omitted the data for age 4 on account of the very small number of cases.

TABLE 18.—AVERAGE SCORES BY AGES FOR FAVORED AND UNFAVORED GROUPS

	Chronological Age			
	5	6	7	8
School A (favored)	27	42	49	56
School B (unfavored)	22	29	35	41

The differences which appear in this table are extremely marked. The advantage is entirely with the favored group, and the average scores run from 10 to 30 per cent. higher than those for the unfavored group.

In order to make a more exact comparison, we took 54 individuals, 26 boys and 28 girls, of School A and then selected individuals of the same sex and of as nearly as possible the same age from School B. Care was taken, in this attempt to match an individual of School A with an individual of School B, to avoid language difficulty. Otherwise, there was no discrimination in the selection. Throughout the discussion we shall designate the pupils of School A as favored and those of School B as unfavored.

Table 19 gives the data for the two groups by tests. The results for boys and for girls are not separated.

TABLE 19.—AVERAGE SCORES BY TESTS FOR SELECTED FAVORED AND UNFAVORED GROUPS

Test	Favored		Unfavored			
	Average Score	m.v.	Average Score	m.v.	difference	mv. d.
1	2.6	0.62	2.2	0.93	0.4	0.15
2	2.9	1.11	2.7	1.13	0.2	0.21
3	2.4	0.77	1.7	1.05	0.7	0.18
4	3.0	0.83	3.0	0.74	0.0	0.15
5	1.9	1.47	1.3	1.45	0.6	0.28
6	3.7	0.62	4.0	0.00	0.3	0.08
7	5.4	1.18	5.3	1.10	0.1	0.22
8	0.9	0.77	0.4	0.58	0.5	0.13
9	3.2	1.59	1.8	1.26	1.4	0.28
10	3.9	1.27	3.4	1.04	0.5	0.22
11	1.4	1.12	1.1	1.09	0.3	0.21
12	1.6	0.94	1.4	0.83	0.2	0.17
13	1.4	1.06	0.8	0.61	0.6	0.17
14	0.4	0.68	0.1	0.17	0.3	0.09
15	2.4	1.27	1.3	1.10	1.1	0.23
16	0.7	0.81	0.3	0.47	0.4	0.13
17	0.4	0.60	0.2	0.38	0.2	0.10
18	0.1	0.20	0.0	0.00	0.1	0.03
19	0.4	0.65	0.0	0.00	0.4	0.09
20	0.5	0.61	0.2	0.33	0.3	0.09

It will be seen that in every test except no. 6 the favored excel the unfavored on the average. In tests 3 (comparison of lines and weights), 9 (comparison of objects), 15 (comprehension of questions), and 19 (definitions of abstract terms), the difference between the two averages is sufficiently larger than the mean variation of the difference to warrant the belief that we have here some tests in which the children from higher social strata excel. Whether this difference in total score shows that an inferior social status results in a lowered mentality, or whether it shows that a lower mentality results in an inferior social status, we cannot, of course, say. However, it is clear that we cannot expect the average child from poor home surroundings to grade as high as a child of the same chronological age from

excellent home surroundings. If the unfavored child should grade above the average of the favored, it would mean that he had the mentality of the average favored child and that he also had the ability to overcome to some extent at least, unfortunate home conditions. To get a true picture of the mental ability of any child, it would be a great advantage if we could compare him first with the average child of his chronological age, and then with the average child of his chronological age and also of his sociological status. (See the suggestion for computing two mental ages for old people.) This idea if carried to its logical extreme would mean perhaps that the total point scale score for any individual child should be compared with the norm for his chronological age, with the norm for his chronological age and his sociological status, with the norm for his chronological age, his sociological status, and his sex, with the norm for his chronological age, his sociological status, his sex, and his race, and so on ad infinitum. Any such degree of detail would, of course, be absurd, for we would soon get to a point where the scale was found much too coarse for any such series of distinctions. However, it is very important to remember that there are certain variables (particularly the degree of facility in the use of English) which have a marked influence on the total score and which should be allowed for somehow, perhaps by special norms, certainly by special norms in the non-English group.

THE INFLUENCE OF SEX

On the basis of total score for the entire scale, no significant sex differences can be made out from the original Point Scale results, but there seem to be sex differences in the case with which certain of the individual tests are passed. Baldwin concludes from a study of the records of 400 delinquent white boys and 400 delinquent white girls that "no sex differences are apparent in tests 1, 2, 3, 4, 5, 6, 7, 9, 11, 12, 18. Girls are markedly superior in 14 and 15, three

words in one sentence, and comprehension of questions which depend upon imagination, command of language forms and judgment in imaginary situations. Boys are superior in 4, 8, 10, 13, 16, 17, 19, 20, which include memory span for digits, comparison of weights, definitions, free associations, drawing designs from memory, recognition of logical absurdity, definition of abstract words and analogy."[1]

THE INFLUENCE OF RACE

During the course of the examinations in School B in the original Point Scale examination, some of the examiners were impressed by certain apparently constant differences in the performances of the Irish and the Hebrews. The indication was that the Hebrews did markedly better in their examinations than did the Irish.

In order to measure the reliability of this suspicion, we have selected a group of 45 Irish pupils, both males and females, ranging in age from four years ten months to fifteen years and ten months, and a similar group of 45 Hebrews, whose ages range from four years eleven months to sixteen years.

The method by which these groups were chosen is as follows. Since the Irish pupils were most numerous, we selected, first, 45 Hebrews, and recorded the sex, age, number of points scored in each test and the total score. We then selected for each individual in the Hebrew group, an Irish pupil of the same sex and of, as nearly as possible, the same chronological age. In a few cases only, is the difference in age greater than one month, while the average age for each group is nine years and two months. The average scores by tests for the two groups are given in table 20.

The differences in the average scores obtained by these two races are so very slight that they are insignificant.

[1] This quotation is from an unpublished manuscript of Dr. B. T. Baldwin.

TABLE 20.—AVERAGE SCORES BY TESTS FOR HEBREW AND IRISH GROUPS

Test	Hebrew	Irish	Test	Hebrew	Irish
1	2.82	3.00	11	1.82	1.82
2	3.42	3.40	12	2.82	2.51
3	2.29	2.36	13	1.78	1.96
4	3.67	3.53	14	1.64	1.51
5	3.20	3.04	15	2.87	3.00
6	4.00	4.13	16	1.56	1.27
7	6.18	6.27	17	1.33	1.33
8	1.24	1.27	18	1.36	1.38
9	3.71	3.73	19	1.04	1.40
10	4.20	4.80	20	1.38	1.00

In the psychological examining in the United States army, a large number of negroes were given the Point Scale examination. No comparison of negro and white intelligence as measured by the Point Scale can be made from these data, however, since individual examinations were given only to those who failed to pass a group examination and therefore any comparison is not between "average whites" and "average negroes" but between "low grade whites" and "low grade negroes." There is, nevertheless, one army report[1] from which we can learn which tests were comparatively easy and which comparatively difficult for the negro. 200 cases of negroes and 200 cases of whites were selected: "(1) Distributed within the letter ratings in the same proportions as those ratings exist in the total negro draft, *i.e.*, so chosen as to have the same percentage of A's, B's, C's, etc., as in the total negro draft of 1762 men; and (2) with each negro case paired off with a white making the same total score, *i.e.*, each negro score of 8, 20, 40, etc., paired off with a white total score of 8, 20, 40, etc. Thus the material compares equal amounts of negro and white intelligence typical of the total amount of intelligence of the whole negro draft . . . The average

[1] Psychological examining in the United States army, *Memoirs of the National Academy of Sciences*, Government Printing Office, Washington, D. C., 1921, 15, p. 738.

scores made by the 188 negroes on the separate tests. . . . are compared with the average scores made by the corresponding whites. The comparison is expressed in terms of the percentage of white score made by negroes." These results are given in table 21 which "gives opposite the number of each test the percentage of white score made by the negroes . . . Taking the results at their face value, the negroes excel the whites in . . . the free association test, using three words in one sentence, definition of abstract terms, and analogies . . . They are inferior in the repetition of sentences, designs from memory, and absurdities . . . The report takes the . . . results (together with the results on certain other examinations) to indicate that the negro as compared with the white man of equal intelligence is relatively strong in the use of language, in acquaintance with verbal meanings, and in perception and observation; and that he is relatively weak in judgment, in ability to analyze and define exactly, and in reasoning."

Table 21.—Percentage of White Score Made by Negroes of Equal Intelligence Rating

Test	Per cent.	Test	Per cent.
1	98.3	11	91.7
2	105.1	12	106.6
3	100.5	13	166.6
4	103.0	14	155.0
5	91.9	15	94.1
6	72.1	16	77.0
7	100.9	17	72.6
8	101.3	18	100.0
9	97.1	19	111.2
10	97.2	20	119.5

INFLUENCE OF AMOUNT OF SCHOOL TRAINING

In a later chapter (Ch. 6, p. 137) we suggest that in the very early years home training and school training are of such permanent importance that they must be considered

in any attempt at measuring the mental age. That is not our present problem. Nor is the question of how many or what tests may be considered tests of school knowledge. The ideal of any mental examination is one which consists solely of tests of ability, not tests of taught information. Such an ideal is, of course, impossible of attainment. An extreme example is found in the tests which require the ability to read. This ability depends, most of all, on whether the child has been taught to read, and thus an individual without schooling is at a decided disadvantage.

Granting, then, that some slight school training is necessary for an average performance on the examination we are interested in the question of whether there is a definite relationship between the number of years spent in school and mental age, or between the marks obtained in school and mental age.

Foster[1] reports the case of a 15 year old boy who had had practically no school training, although he had learned to read, who had had practically no contact with other children, and no home education save what he may have picked up from the reading of a few religious books, and perhaps a stray copy of a newspaper, and who still received a mental age of 16.0 on the Point Scale.

Anderson[2] studied the relation between mental age and grade location in the institution school of 150 girl delinquents. With his own results he combines those of various other investigators, and concludes that "There is apparently a close relationship between chronological age and mental age and between chronological age and school grade in normal children. But there is little relation between mental age and grade location. . . In institutions for delinquents a different situation holds . . . It appears that there is practically no relationship between chronological age and mental age, some relation between chronological age and school grade, and a close relationship between mental age and school grade." These results

[1] *Journ. of Applied Psych.*, 1919, 3, 167–171.

[2] *Journ. of Delinquency*, 1921, 4, 271.

would go to show that when the chronological age of the child is of little importance (as in the case of the delinquents) that the location in school grade is roughly determined by the mental age. The reason for the obscuring of the relationship in the case of the normal children may be explained partly by the fact that our school system gives little opportunity for the very superior child to skip through enough grades to bring him with his mental equals, and partly by the fact that progress in school necessarily depends more upon what the child *does* than upon what he *can* do, whereas the mental tests are intended to show what the child can do, not what he has done for any period.

Such results as we have cited above, do not, of course, tell us how much school training helps a child in an intelligence examination.

In chapter 5 we give some evidence upon the relationship between scholarship and intelligence among college students.

CHAPTER 4

AN ABBREVIATED PRE-ADOLESCENT POINT SCALE

In the psychological examinations in the army, it was found impossible to take time to give the entire Point Scale and therefore an abbreviated Point Scale was devised with a total possible credit of 50 points. The tests selected to form this short Point Scale were: 2 (missing parts), 4 (memory span for digits), 9 (comparison of objects), 10 (definition of concrete terms), 12 (copying square and diamond), 15 (comprehension of questions), 16 (drawing designs from memory), 17 (absurdities), and 20 (analogies).

"These are not in all cases the tests having the highest diagnostic value, since it was necessary to consider time required to give a test, suitableness and illiterate subjects, and desirability of obtaining a short scale comparable in difficulty throughout its range with the entire scale."[1]

"The data on the abbreviated point scale consisted of 479 records. The average score for the entire scale was 53.3; for the abbreviated scale 26.6.

"The total score on the abbreviated scale is 50 points. Records of 476 men were recorded on the abbreviated scale and the scores obtained multiplied by 2. The deviations of the short scale scores in points from the scores on the entire scale were then calculated.

"The median deviation was found to be 3 points, and the mean deviation 4.14 points. Since the yearly increments in points beginning with mental age 5 are 6, 7, 6, 9, 8, 6, 6 and 4 up to mental age 13, it will be seen that the median deviation of 3 points corresponds to approximately a half year in mental age from 5 to 8, about a third of a

[1] Psychological examining in the United States Army, *Memoirs of the National Academy of Sciences*, Government printing office, Washington, 1921, 15, p. 412.

year from 8 to 10, a half year from 10 to 12, and three-quarters of a year at 13 . . . The correlation of abbreviated with complete Point Scale for the 475 subjects, ranging in mental age from 4 to 18 years, was 0.934 (Pearson)."

Table 22 is a reprint of a table given in "Psychological examining in the United States Army," showing the correlation between the brief and the complete Point Scale.

TABLE 22.—CORRELATION OF BRIEF WITH COMPLETE POINT SCALE
(r = 0.934)

Complete point scale	Brief point scale													
	0–3	4	8	12.	16	20	24	28	32	36	40	44	48	Total
96–													1	1
88–95											1	4		5
80–87										2	5	1		8
72–79								1	11	13	7			32
64–71							1	12	28	11	1			53
56–63						1	17	65	16	2				101
48–55					1	16	60	30	2					109
40–47					14	42	25	3						84
32–39				8	19	13	2							42
24–31			2	15	13	1								31
16–23		1	5											6
8–15	1	1	1											3
0–7														0
Total...	1	2	8	23	47	73	105	111	57	28	14	5	1	475

Several other short Point Scales were worked out at different camps in the army, but these show a lower correlation with the complete scale than does the abbreviated scale given above.

In all such abbreviated scales, we find mean deviations from the entire scale of approximately half a year mental age. This deviation is, of course, large enough to necessitate caution in the use of any brief scale, if the results so obtained are to be compared with those from the entire scale.

CHAPTER 5

A POINT SCALE FOR THE MEASUREMENT OF INTELLIGENCE IN ADOLESCENT AND ADULT INDIVIDUALS[1]

The application of the original pre-adolescent point scale has proved that it yields most reliable measurements of intelligence from the ages of 6 or 7 to 12 or 13 years. The scale offers too few opportunities for credit to individuals under 7 years, and too few opportunities for failure to bright individuals above 13 years. It has, therefore, seemed to us desirable to develop two additional point scales to supplement the original scale: the one to be called an infant scale; the other, an adolescent scale. With the completion of these, we should have, for the measurement of intelligence, three scales of twenty tests each which may conveniently be designated as: (1) the infant scale, (2) the child scale, and (3) the adolescent scale. The latter should be understood as covering maturity as well as adolescence.

Late in 1915 we assembled twenty tests as an adolescent point scale group, arranged them chiefly in accordance with convenience of presentation, weighted them in the light of our clinical experience, and proceeded to accumulate data which should enable us thoroughly to criticize the proposed scale and profitably to revise or reconstruct it.

It is the purpose of this report to describe the initial form of the adolescent point scale with the directions for its use, and to present certain general results from approximately two hundred and fifty examinations.

It should be stated with emphasis that the point scale herein described is merely a provisional group of tests

[1] The first part of this chapter is a reprint of an article by Robert M. Yerkes and Cecilio S. Rossy published in the *Boston Medical and Surgical Journal*, 1917, 176, pp. 564–573. Being Contribution of the Massachusetts Commission on Mental Diseases, whole number 167 (1917.1).

which we have no thought of standardizing, but which we propose to revise thoroughly on the basis of the results obtained by various examiners before we enter upon the task of securing norms for the individual tests and for a revised form of the scale.

The record blank which we have employed is reproduced below. It consists of four pages, the tests on which are so arranged that all of those involving writing or drawing by the subject appear on the last page.

Most of the tests of the group are in principle old, although much new material has been introduced, and in a few instances the tests have been so modified as to be markedly different from their earlier forms.

For Test 1 there are used, instead of the Binet pictures, three Perry pictures (Boston Edition, penny size):

(*a*) Picture No. 893, entitled "Saved."

(*b*) Picture No. 1076, entitled "The Music Lesson."

(*c*) Picture No. 2785, entitled "The Child Handel."

For Test 2 the same set of weighted cubes is employed as in the original point scale. The Healy butcher shop picture is used for test 4, in accordance with the directions given below.

Test 12 is a new test based upon the Yerkes multiple choice method of measuring ideational efficiency.[1] The five cards which are used as materials for this test appear in Fig. A (p. 101) reduced one-half. In our set of materials, the standard card for this test measures 6 by 8 inches.

Tests 13, 14, and 17 are taken directly from the Stanford Scale.

The material for test 15 is presented on the record blank, on the fourth page of which appear seven capital letters, which are to be arranged in order of increasing total length of line.

For the code learning test an explanatory drawing and letter code with the word *nor* written in symbols is first

[1] Yerkes, Robert M.: The mental life of monkeys and apes: a study of ideational behaviour. *Behaviour Monograph*, 1915, vol. 3.

RECORD BLANK FOR YERKES-ROSSY ADOLESCENT-ADULT POINT SCALE EXAMINATION

NAME..... AGE.... DATE OF BIRTH..... SCORE.....

DATE..... PLACE OF BIRTH..... I.Q.....

EXAMINED BY..... NATIONALITY..... MENTAL AGE.....

TEST	CREDITS
1. Response to pictures (3 each).....	
(*a*)	
(*b*)	
(*c*)	
2. Comparison of weights (1 each).....	
(*a*) 6 and 9 grams.	
(*b*) 12 and 15 grams.	
(*c*) Arranging weights 3, 6, 9, 12 and 15 grams in order.	
3. Memory span for digits (1 each).....	
(*a*) 9–2–8–7–4 6–1–8–5–3	
(*b*) 5–8–2–7–6–9 8–4–7–3–9–2	
(*c*) 7–2–8–3–1–6–5 1–7–4–9–5–2–6	
(*d*) 6–9–4–1–3–8–2–7 3–8–1–5–9–4–6–2	
(*e*) 2–9–4–7–5–8–6–3–1 4–9–2–6–7–5–1–3–8	
4. Suggestibility (5).....	
1 2 3 4 5 6 7 8 9 10	
11 12 13 14 15 16 17 18 19 20	
5. Memory for unrelated sentences (1 each).....	
(*a*) The sea is very rough. Skill comes with patience.	
(*b*) There are many kinds of play and work. We should always be truthful.	
(*c*) No one can afford to be untrue to himself. It is time for us to return.	
(*d*) I saw a large, black object in the sky. If he had seen the happy young face, his heart would have melted.	
(*e*) As we looked across the dusty, gray plain, our eyes ached. It is not possible to acquire too many good habits of mind.	

TEST	CREDITS
6. Comparison of terms (2 each)	
(*a*) Milk and water.	
(*b*) Paper and iron.	
(*c*) Idleness and laziness.	
Comprehension of questions (1 each)	
(*a*) Why is a train safer than a steamer or an aeroplane?	
(*b*) Why is it better to judge people by what they do rather than by what they say?	
(*c*) Why should we be more ready to forgive an unkind act done in anger than one done without anger?	
(*d*) Why should a man accused of a crime be considered innocent until he is proved guilty?	
(*e*) Why is honesty the best policy?	
8. Definitions of abstract and concrete terms (2 each)	
(*a*) House.	
(*b*) Door.	
(*c*) Honesty.	
(*d*) Conceit.	
9. Appreciation of absurdities (1 each)	
(*a*) It has been found that the last car of a train is damaged most in case of an accident. It therefore seems best to leave off the last car.	
(*b*) The commissioners have resolved to build a new jail from the materials of the old jail, but they are going to keep the prisoners in the old jail until the new one is finished.	
(*c*) A father wrote to his son: "I enclose ten dollars. If you do not receive this letter, please send a telegram."	
(*d*) A man wished to dig a pit in which to bury some rubbish. He could not decide what to do with the dirt from the pit. A friend suggested that he dig the pit large enough to hold the dirt too.	
(*e*) A man claims that he has a telescope which is so powerful that when he looks at a church five miles away, it appears so near that he can hear the organ playing.	

TEST	CREDITS
10. Analogies (1 each)	
(*a*) Pocket is to coat as to closet is to	
(*b*) Sun is to day as moon is to	
(*c*) Arm is to elbow as leg is to	
(*d*) Known is to unknown as present is to	
(*e*) Whole is to part as six is to	
(*f*) Sunday is to Saturday as January is to	
11. Association of opposites (4)	

Wise	Never	Busy	Generous	Many
Silent	Joy	Distant	Horrid	Rough
Similar	Prompt	Lazy	Rude	Upper
Cheap	Vacant	Easy	Top	After

12. Relational test (2 each)	
(*a*) Middle.	
(*b*) Second from left.	
(*c*) Fourth from right.	
(*d*) One place to right of middle.	
13. Box test (1 each)	
(*a*) Large box containing two smaller boxes with one still smaller in each of the two.	
(*b*) Large box containing two smaller boxes with two inside of each.	
(*c*) Large box containing three smaller boxes with three inside of each.	
(*d*) Large box containing four smaller boxes with four inside of each.	
14. Ingenuity (7)	
(*a*) If you were asked to get seven pints of water from a well, and were given a three-pint vessel and a five-pint vessel, could you measure out exactly seven pints without guessing at the amount if you began by filling the five-pint vessel first? (3)	
(*b*) Five and seven-pint vessels to get eight pints, filling first the five-pint vessel? (2)	
(*c*) Four and nine-pint vessels to get seven pints, beginning by filling the four-pint vessel? (2)	

TEST | CREDITS

15. Comparison of capital letters (2).....

L H N I Y V M

16. Code learning test (3 each).....

(*a*) *h* *c* *f* *i* *b* *g* *d* *a* *e*

(*b*) 5 8 1 7 2 4 9 3 6

17. Ball and field (2).....

18. Geometrical construction (4)...

19. Reproduction of diamonds (2).....

20. Memory for designs (2 each) (*a*).....(*b*).....

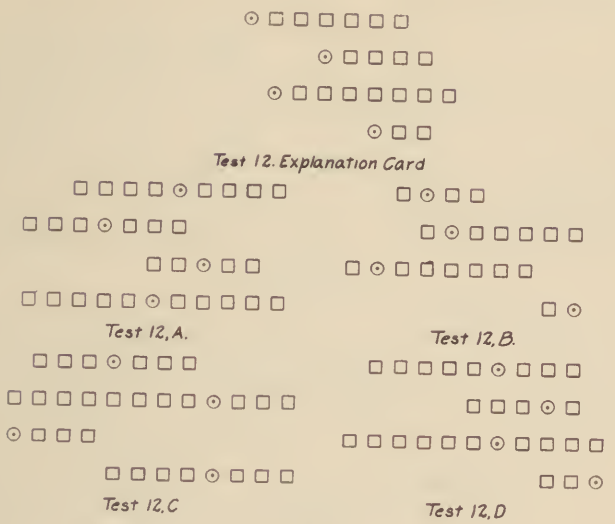


Fig. A.

presented by the experimenter.[1] Then the cards, reproduced half-size, as Fig. B, are presented.

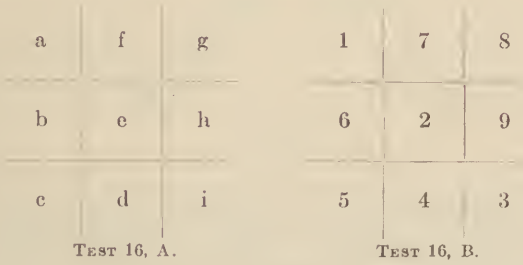
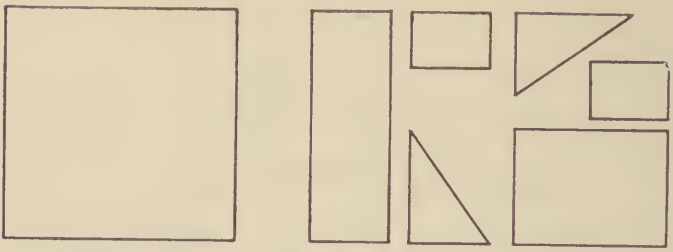


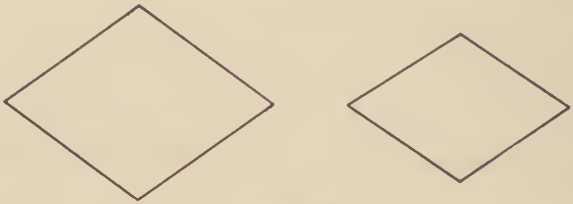
Fig. B.

Test 18 was devised by the writers as a visual construction test, the card for which appears at the top of Fig. C, reduced one-half. This figure likewise presents the materials for tests 19 and 20, both of which are new as to material, old in principle.

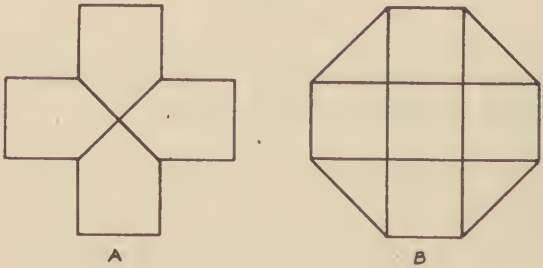
[1] This appears in the directions for examination.



Test 18.



Test 19.



Test 20.

FIG. C.

The full directions for the making of an adolescent point scale examination follow. They are intentionally brief and have already served their purpose as guides in a preliminary application of the scale by several experienced examiners.

BRIEF PRELIMINARY DIRECTIONS FOR USING THE ADOLESCENT-ADULT POINT SCALE

These directions will suffice for experienced examiners only.

The scale is to be used only for individuals whose intellectual ability appears to be equal to or greater than that of the twelve-year-old child.

The order of tests need not be followed strictly if good reasons for change appear.

This scale has not yet been standardized and is subject to revision. Norms are to be established.

It is desirable to keep very full records of responses, in order that the tests may be criticized, modified, and standardized.

MATERIALS

Stop-watch.

Test 1. Three Perry pictures ("Saved," "The Music Lesson," and "The Child Handel").

Test 2. Set of five weighted cubes, 3, 6, 9, 12, and 15 grams.

Test 4. Picture of butcher shop (Healy).

Test 12. Five cards for relational test.

Test 16. Two cards for code test.

Test 18. Cards for geometrical test.

Test 19. Card for reproduction of diamonds.

Test 20. Card for memory for designs.

DIRECTIONS

Test 1. Response to pictures (maximum credit, 9 points).

Three Perry pictures are to be used in this test: (*a*) "Saved;" (*b*) "The Music Lesson;" (*c*) "The Child Handel."

Picture (*a*) is placed before the subject, and the examiner says: "Please describe this picture for me as well as you can." As soon as the subject has completed the description, if interpretation has not already been given, ask: "What does it mean?"

Give credit as follows for each picture: For excellent description (at least eight features correct) give 2 points; same with correct interpretation, 3 points. For good description (four to seven features correct) give 1 point; same with correct interpretation, 2 points. For meager description (only two or three features correct), with correct interpretation, give 1 point. For simple enumeration, allow no credit.

Time for each picture, 2 minutes.

Test 2. Comparison of weights (maximum credit, 3 points).

Have the five weights arranged in order, so that they can be presented quickly and without trial. Then present as part (*a*) of the test, the weights 6 and 9 grams, saying: "Tell me, please, which is the heavier of these two blocks." Similarly, (*b*), present the 12- and 15-gram blocks. (*c*) Present the five weighted blocks, saying: "Please arrange these in order of increasing weight, the lightest at one end, the heaviest at the other."

To avoid the extreme risk of guesses, give two trials for parts (*a*) and (*b*). Give only one trial for part (*c*), but let the second trial for parts (*a*) and (*b*) follow part (*c*).

It is especially important in this test that the examiner should not suggest the lifting of the weights or any other method of comparison.

Give credit as follows: For (*a*) give 1 point if the weights are immediately compared by lifting and if correct judgments are given in both trials. Give no credit if a mistake is made in either trial. Likewise, for part (*b*) give 1 point credit for correct and immediate judgment on the basis of lifting, allowing no credit if a mistake is made in either trial. For (*c*), give 1 point credit if the weights are arranged in correct order. Allow no credit if a mistake is made.

Time for (*a*) 30 seconds; (*b*) 30 seconds; (*c*) 1 minute.

Test 3. Memory span for digits (maximum credit, 5 points).

Say to the subject: "Please listen carefully and as soon as I stop, repeat just what I have said."

	Trial 1	Trial 2
(*a*)	9–2–8–7–4	6–1–8–5–3
(*b*)	5–8–2–7–6–9	8–4–7–3–9–2
(*c*)	7–2–8–3–1–6–5	1–7–4–9–5–2–6
(*d*)	6–9–4–1–3–8–2–7	3–8–1–5–9–4–6–2
(*e*)	2–9–4–7–5–8–6–3–1	4–9–2–6–7–5–1–3–8

Present the digits orally at the rate of two per second, enunciating very clearly and distinctly. If the subject fails to reproduce a given group, present the group containing the same number of digits under Trial 2. If the subject fails in this trial, proceed no further with the test; but if, instead, success is attained, present in like manner the next larger group of digits under Trial 1, and continue according to the above directions until the subject has failed in both trials for a given group of digits.

Give 1 point credit for the perfect reproduction, in either Trial 1 or Trial 2, of each of the five parts of the test.

Time, 2 minutes.

Test 4. Suggestibility (maximum credit 5 points).

Present the picture of a butcher shop (Healy) to the subject, with the statement: "I am going to show you a picture for ten seconds. Please look at it carefully so that you can answer some questions I shall ask about it." Allow the subject ten seconds for the examination of the picture, then remove it and ask as rapidly as possible the following twenty questions, recording the subject's responses thus: Let + indicate correct statement or resistance; −, incorrect statement or acceptance of suggestion. The questions involving suggestion are indicated by S.

1. Did you see a woman and a man?
S. 2. Were there two children with the woman?
3. Did you see the sausages in the butcher's hand?
S. 4. Did you notice the electric light over the counter?
5. Was there a dog in the shop?
S. 6. Did you see the open door of the shop?
7. The woman had a basket on her arm, did she not?
S. 8. How many oranges were in the basket?
9. Did you see the chopping block?
S. 10. And the stool behind the butcher?
11. Were the scales hanging up?
S. 12. Was the cash register on the counter?
13. The knife in the butcher's hand as a large one, wasn't it?
S. 14. Did you notice the people on the street?

15. Had the little girl bundles in her arms?
S. 16. Was her hair-ribbon red or blue?
17. Did you see the ice box (refrigerator) behind the butcher?
S. 18. Was the butcher's hat black?
19. Was the floor clean?
S. 20. How many windows did you see?

Give 5 points' credit if all the suggestions are resisted either by correct statement or by the statement: "I don't know." Give 4 points if nine of the ten suggestions are resisted. Give 3 points if eight of the ten are resisted. Give 2 points if seven of the ten are resisted. Give 1 point if six of the ten are resisted.

Time, 15 seconds for each question.

Test 5. Memory for unrelated sentences (maximum credit, 5 points).

Say to the subject: "Now please listen very carefully, and after I stop, repeat just what I have said." Then present the following sentences in order, with almost no pause between the two sentences of a given part.

(*a*) The sea is very rough. Skill comes with patience.
(*b*) There are many kinds of play and work. We should always be truthful.
(*c*) No one can afford to be untrue to himself. It is time for us to return.
(*d*) I saw a large, black object in the sky. If he had seen the happy, young face, his heart would have melted.
(*e*) As we looked across the dusty, gray plain, our eyes ached. It is not possible to acquire too many good habits of mind.

Give 1 point credit for precisely correct reproduction of each part. Give no credit if a single error is made, unless it is clearly a case of a misunderstood word. Allow only one trial.

Time, 15 seconds for each part.

Test 6. Comparison of terms (maximum credit, 6 points).

Say to the subject: "I wish you would compare as well as you can, milk and water; that is, tell all the important

likenesses and differences you can think of." Similarly, present as part (*b*) the terms paper and iron; as part (*c*), the terms idleness and laziness.

Give 2 points credit for a comparison involving four or more correct and important elements in case of (*a*) or (*b*), and the essential differences in case of part (*c*).

Give 1 point for two or three correct and important elements in case of (*a*) or (*b*) and the correct defining of either term in case of (*c*).

Time, 2 minutes for each part.

Test 7. Comprehension of questions (maximum credit, 5 points).

Say: "I shall now ask you some questions. Please answer them as satisfactorily as you can."

(*a*) Why is a train safer than a steamer or an aeroplane?
(*b*) Why is it better to judge people by what they do rather than by what they say?
(*c*) Why should we be more ready to forgive an unkind act done in anger than one done without anger?
(*d*) Why should a man accused of a crime be considered innocent until he is proved guilty?
(*e*) Why is honesty the best policy?

Give one point credit for correct answers or such as in your judgment show fair insight, judgment, and reasoning ability. Disagreement with the answer suggested by the form of the question should receive credit if logically supported. Differences from the conventional type of answer may indicate superiority, and should, if reasonable, receive full credit. It is important to grade closely.

Time, 2 minutes for each part.

Test 8. Definitions (maximum credit, 8 points).

Say to the subject: "I wish you to define, as accurately as you can, the following words." Or, if the subject is comparatively illiterate, say: "I wish you to tell me what these words mean: (*a*) house; (*b*) door; (*c*) honesty; (*d*) conceit."

Give 2 points credit for an excellent form of definition containing the essential elements, whether or not conventional. Give 1 point credit for a definition which involves

enough correct elements for the certain identification of the concept.

Time, 1 minute for each term.

Test 9. Appreciation of absurdities (maximum credit, 5 points).

Say to the subject: "I am going to read some sentences to you and I wish you to tell me what you think of them."

The examiner must be especially careful not to suggest that the sentences are foolish or absurd.

(*a*) It has been found that the last car of a train is damaged most in case of an accident. It, therefore, seems best to leave off the last car.

(*b*) The commissioners have resolved to build a new jail from the materials of the old jail, but they are going to keep the prisoners in the old jail until the new one is finished.

(*c*) A father wrote to his son: "I enclose ten dollars. If you do not receive this letter, please send me a telegram."

(*d*) A man wished to dig a pit in which to bury some rubbish. He could not decide what to do with the dirt from the pit. A friend suggested that he dig the pit large enough to hold the dirt, too.

(*e*) A man claims that he has a telescope which is so powerful that when he looks at a church five miles away, it appears so near that he can hear the organ.

Give 1 point credit for each detection and clear statement of an absurdity. Grade closely.

Time, 1 minute for each part.

Test 10. Analogies (maximum credit, 6 points).

"If I should say, 'Man is to boy as woman is to—', how would you complete the sentence?" If the subject says, "girl," proceed with the next example. If not, supply the missing word. "Boat is to water as train is to —." Again give the subject an opportunity to complete the sentence, and if he is unable to do so, supply the missing word.

Having made clear the nature of the text, proceed to present in order the following six analogies:

(*a*) Pocket is to coat as closet is to —.
(*b*) Sun is to day as moon is to —.
(*c*) Arm is to elbow as leg is to —.
(*d*) Known is to unknown as present is to —.
(*e*) Whole is to part as six is to —.
(*f*) Sunday is to Saturday as January is to —.

Give 1 point credit for each correct response. Grade carefully and closely. Time for each part, 30 seconds.

Test 11. Association of opposites (maximum credit, 4 points).

Say to the subject: "I am going to read off a list of words, and as I read them, I wish you would give me the opposite of each word, like this: high—low; large—small; hard—soft. Now we shall begin."

Wise	Never	Busy	Generous	Many
Silent	Joy	Distant	Horrid	Rough
Similar	Prompt	Lazy	Rude	Upper
Cheap	Vacant	Easy	Top	After

Give 4 points credit for correct response to each of the twenty words. Give 3 points credit if not more than three mistakes appear. Give 2 points credit if not more than six mistakes appear. Give 1 point credit if not more than 9 mistakes appear.

Time, 3 minutes.

Test 12. Relational test (maximum credit, 8 points).

Explain thus to the subject the nature of the test: "I am going to show you a card with four lines of squares and circles on it." Then show the explanation card with the circle in each case as the first symbol at the left and ask the subject, "What is the relation of the circle to the squares on this card?" If he does not perceive that it is always the first symbol at the left, explain this relation to him. Make perfectly sure that the idea of uniform relationship, that is, the same relationship for each of the four lines, is grasped. Having thus made plain the nature of the test, present in turn cards representing the four relations of symbols (Fig. A, p. 101).

(*a*) Middle.
(*b*) Second from left end.
(*c*) Fourth from right end.
(*d*) One place to the right of middle, or always two more squares on the left of the circle than on the right.

Give 2 points credit for each part for which the relation is discovered and correctly formulated. Give 1 point credit if the relation is so perceived that it can be reproduced in new groups of symbols, but cannot be expressed in words.

Time, 2 minutes for each part.

Test 13. Box test (maximum credit, 4 points).

"Please tell me how many boxes you would have if I gave you: (*a*) A large box with two smaller boxes inside of it, and inside of each of the smaller boxes, one still smaller. (*b*) A large box with two smaller boxes inside of it, and inside of each of the smaller boxes, two still smaller. (*c*) A large box with three smaller boxes inside of it, and inside of each of the smaller boxes, three still smaller. (*d*) A large box with four smaller boxes inside of it, and inside of each of the smaller boxes, four still smaller."

Give 1 point credit for correct response in case of each part.

Time, 1 minute for each part.

Test 14. Ingenuity (maximum credit, 7 points).

Say to the subject: "I am going to give you some practical problems. If you wish to, you may use this pencil and paper in working them out." Then present: (*a*) "If you were asked to get seven pints of water from a well and were given a three-pint vessel and a five-pint vessel, could you measure out exactly seven pints without guessing at the amount, if you began by filling the five-pint vessel first? You understand that you have no third vessel, but if you want to, you can throw out water."

If the subject fails to solve this problem in three minutes, explain it to him in the following way: "Fill the five-pint vessel. Then from it, fill the three-pint vessel. Now, empty the three-pint vessel. Pour the two pints remaining in

the five-pint vessel into the three-pint vessel and refill the five-pint vessel. As a result, you will have precisely seven pints of water in the two vessels."

After the correct solution of (*a*), either by the subject or with the aid of the experimenter, present as (*b*): "If you were asked to get eight pints of water and were given a five-pint vessel and a seven-pint vessel, could you measure out exactly eight pints of water without guessing at the amount, if you began by filling the five-pint vessel first? (*c*) If you were asked to get seven pints of water and were given a four-pint vessel and a nine-pint vessel, could you measure out exactly seven pints without guessing at the amount, if you began by filling the four-pint vessel first?"

Make sure that the problems are understood, so far as the subject is capable of understanding them.

Give 3 points credit for correct and independent solution of problem (*a*). Give 2 points credit for correct solution of problem (*b*), either with or without explanation of problem (*a*). Give 2 points credit for problem (*c*), either with or without explanation of problem (*a*).

Time, 3 minutes for part (*a*); 2 minutes for part (*b*); 2 minutes for part (*c*).

Test 15. Comparison of capital letters (maximum credit, 2 points).

Present to the subject on page 4 of the record sheet the capital letters L, H, N, I, Y, V, and M, saying: "Please look at these letters carefully and arrange them in order of the length of line which is needed to make them. You see if you straighten out the M, it would make a much longer line than the I." Make sure that the subject understands what is meant. Then give him a pencil and have him write the letters on the record sheet, in the space provided, in what he conceives to be the correct order.

Give 2 points credit for the correct order—I, L, Y, V, H, N, M. Give 1 point if either of the pairs of letters L, Y, or H, N, is reserved. Give no credit if both pairs are reversed, and no credit for anything poorer.

Time, 2 minutes.

Test 16. Code learning test (maximum credit, 6 points). Explain the purpose and meaning of the code test by drawing the following figure and indicating to the subject the symbols for the word "nor."

After you are sure that the subject understands the nature of the test, say: "I am now going to show you a figure in which different letters are used. I shall let you study it for twenty seconds; that is a very short time. Please try to learn it so that you can write the symbol for each letter."

Then present the appropriate card for code (*a*), allow the subject twenty seconds for observation, and immediately thereafter have him reproduce the symbols for the letters as given on the record sheet under the test. (See Fig. B, p. 101.)

This part having been completed, present in similar fashion the card for part (*b*), the number code. Allow twenty seconds for the learning of the code. Then have the subject reproduce the symbols for the digits as they appear on the record sheet.

Give 3 points credit for correct reproduction in case of each part. Give 2 points credit if one error is made. Give 1 point credit if not more than three errors are made.

Time for reproduction of each part, 1 minute.

Test 17. Ball and field (maximum credit, 2 points). Present to the subject the broken circle on page 4 of the record sheet, saying: "If you were told that a ball had been knocked into this field and lost in the grass, and you

had no notion as to the direction from which it came, or where it may have landed, how could you most quickly and easily find it? Show me on this paper what path you would follow in searching for it." Have the subject trace a path in the circle which appears on page 4 of the record sheet.

Give 2 points credit for an inward or outward spiral or for a systematic back and forth plan (straight or curved path). Give 1 point credit for concentric circles or for radii or diameters systematically followed. Give no credit for anything poorer.

Time, 2 minutes.

Test 18. Geometrical construction test (maximum credit, 4 points).

Place before the subject the geometrical construction card (Fig. C, p. 102), saying: "Here is a drawing with a number of parts or pieces. If they are properly fitted together, they will make a square. Now please take this pencil and show me how the parts can be fitted together to just fill this square." (One of the squares on page 4 of the record sheet.)

If the subject does not get the parts properly arranged on the first attempt, allow him to try again in the second square on the record sheet.

Give 4 points credit for correct arrangement of the parts on first trial. Give 2 points credit for correct arrangement on second trial. Give 1 point credit if all parts are correctly placed, except the two triangles, in the second trial.

Time for first trial, 2 minutes; for second trial, 2 minutes.

Test 19. Reproduction of diamonds (maximum credit, 2 points).

Present squarely before the subject, with the base of the card toward him, the pair of diamonds (Fig. C) and say: "I wish you to copy these two figures very carefully and accurately." The reproduction should be made on page 4 of the record sheet in the proper space, with a pencil. The subject should not be allowed to move the paper about.

Give 2 points credit for approximate correctness in form and size. Give 1 point credit for easily identifiable reproduction of form but failure to reproduce the relative sizes.

Time, 1 minute.

Test 20. Memory for designs (maximum credit, 4 points).

Say to the subject: "I am going to show you a pair of drawings. After you have looked at them for ten seconds, I shall take them away and ask you to draw both of them from memory. Look at them very carefully." Then present for ten seconds the card bearing the two designs (Fig. C). Have the subject reproduce the designs with pencil in the space provided on page 4 of the record sheet.

Give 2 points credit for correct and accurate reproduction of (*a*) or (*b*). Give 1 point credit for (*a*) or (*b*) if a minor imperfection appears, such as the omission of the cross lines or their introduction in the wrong figure.

Time, 2 minutes.

GENERAL RESULTS OF APPLICATION OF SCALE

To the following expert examiners who have generously aided us, we take pleasure in expressing our obligation and our thanks: Drs. Helen T. Woolley, Thomas H. Haines, R. H. Sylvester, Josephine N. Curtis, Mabel R. Fernald, Frederick L. Wells, Miss Rose S. Hardwick, and Mr. Willard L. Smith.

As it is our intention to use our data (both measurements and criticisms) as the basis for a revision of the scale which will be reported later, we shall present in this connection only the ranges of scores and the averages for various groups of subjects. These will serve examiners temporarily as rough norms or standards to regulate expectation.

For a group of twenty-three women in the reformatory at Bedford Hills, New York, the adult scores ranged from 14 to 61 points. The relation of these scores to the preadolescent scores are exhibited in table 23 (1).

TABLE 23 (1).—BEDFORD HILLS GROUP (DR. FERNALD)

Age	Adult score	Pre-adolescent score
29.3	14	62
19.5	16	57
32.2	18	65
22.2	20	67
21.2	21	58
19.0	22	63
37.6	24	64
16.0	27	59
16.7	27	74
26.6	28	61
16.7	29	70
21.7	31	66
24.6	34	75
20.9	35	74
25.7	36	62
17.5	36	77
19.3	39	72
29.2	49	80
21.0	50	90
22.6	52	81
18.3	55	82
18	56	85
22	61	86
	—	—
Averages for 23 cases...	34	71

Adult score = 0.48 of pre-adolescent score.

Similarly the range for a group of thirty-three high-grade pupils in the School for the Feeble-minded at Waverley, Massachusetts, is 18 to 59 points. Few of these individuals would be in the school except for affective peculiarities and resulting delinquencies. Table 24 (2) presents the scores for the group.

It is to be noted that the ratios of the adult score to the pre-adolescent score are nearly the same: .48 : 1.00 for the Bedford Hills group and .51 : 1.00 for the Waverley group. The conclusion indicated is that for subjects of medium to poor intelligence the adult score will be approximately one-half the pre-adolescent score.

TABLE 24 (2).—WAVERLEY GROUP (DR. CURTIS)

Age	Adult score	Pre-adolescent score
25.3	54	80
32.8	56	82
16.7	59	84
26.7	20	62
38.0	18	68
19.6	26	71
30.8	27	72
26.9	27	79
19.7	52	83
20.9	28	73
24.3	28	65
28.1	29	67
25.6	32	80
18.9	32	77
23.0	32	70
25.3	32	69
19.6	33	72
25.0	36	73
23.2	40	72
25.3	40	79
24.3	40	73
17.0	41	74
25.8	41	84
24.5	41	73
21.8	42	79
20.6	42	77
26.7	44	89
22.3	45	89
20.0	47	85
17.0	47	83
20.7	47	86
17.0	49	83
18.6	54	92
	—	—
Averages for 33 cases...	39	77

Adult score = 0.51 of pre-adolescent score.

A non-selected group of fifteen grammar school pupils, aged 12.6 to 16.4 years, scored from 32 to 70 points. The numbers are not large enough to supply safe age-norms.

Twenty-five working children, aged 15 to 16 years, obtained scores from 24 to 72.

A group of eighty college students and professionally trained persons yields a range of 64 to 98 points.

The following averages supplement the ranges already given:

Average score for fifteen working children, 15 to 16 years, 45 points.

Average score for fifteen nurses, 52 points.

Average score for fifteen college students, 86 points.

Average score for fifteen physicians and teachers, 90 points.

Our results indicate that tests 12 and 14 are unsatisfactory in their present form and should be modified for use in an adolescent-adult point scale.

ADOLESCENT-ADULT POINT SCALE APPLIED TO COLLEGE STUDENTS

Yerkes and Burtt[1] presented the Adolescent-adult Point Scale as a group test to one hundred members of a class in psychology in a college for men and to one hundred and nineteen members of a class in psychology in a college for women. Their results are given in brief in table 25.

TABLE 25.—DISTRIBUTION OF ADOLESCENT-ADULT POINT SCALE SCORES

Scores	Men	Women
50–54	.....	1 (0.9 per cent.)
55–59	.....	1 (0.9) per cent.)
60–64	.....	8 (6.7 per cent.)
65–69	6 (6 per cent.)	11 (9.2 per cent.)
70–74	11 (11 per cent.)	27 (22.6 per cent.)
75–79	25 (25 per cent.)	40 (33.6 per cent.)
80–84	23 (23 per cent.)	23 (19.3 per cent.)
85–89	23 (23 per cent.)	8 (6.7 per cent.)
90–94	11 (11 per cent.)	
95–100	1 (1 per cent.)	

The mean total score for men in 81.06 and for the women 75.24. The mean variations for the two sexes are 5.78

[1] *School and Society*, 1917, 5, pp. 535–540.

and 5.48. The writers state that "(1) We are justified in concluding *for the groups in question* that the college men, with respect to the majority of intellectual functions measured by the point-scale method, rank higher than the college women. (2) That the superiority of the men is especially marked in tests which involve reasoning or other fairly complex thought processes,[1] while the sex differences are least for tests of perception, memory, and imagination. (3) That a slightly higher percentage (16 per cent.) of the women are of subnormal[2] intelligence than of the men (12 per cent.). (4) That the correlation of point scale measurements with educational performance is strikingly positive for the group of men observed and somewhat less so for the group of women."

SUGGESTIONS FOR REVISION OF ADOLESCENT-ADULT POINT SCALE

On use of this intelligence examination with the varied adolescent and adult groups listed on pages 114ff and detailed statistical study of data for 226 cases, the following proposals for the revision and improvement of the scale are based.

The principal changes aside from directions for administration are presented in tabular arrangement on p. 119. They include rearrangement of tests, omission of three and substitution of others, and readjustment of grades.

The use of tests 2, 14 and 19 is contraindicated by results. Test 2, comparison of weights, is obviously unfair to many manual laborers. Test 14, ingenuity, is sex differentiating and therefore unsatisfactory in this scale. It is also too difficult, as indicated by failure of 62 per cent. of subjects to score. Test 19, reproduction of diamonds, is too easy and fails to distribute subjects.

[1] It is suggested that the sex difference apparent in the results may not be a real sex difference since the two colleges draw quite different classes of students. The men's college is a typical New England "College of Liberal Arts" whereas the women's college is distinctly a technical school.

[2] "Subnormal" here means the group of individuals who received a coefficient of intelligence between 0.71 and 0.90 where the expected score (used as a divisor) was taken as the mean score for their sex.

PROPOSED REVISION OF ADOLESCENT-ADULT POINT SCALE

Number and name of test	Maximum time allowance	Maximum credit
1. Comparison of terms	2′ each part	6
2. Definitions	1 each part	8
3. Digits forward	Immediate	5
4. Comprehension of questions	2′ each part	8
5. Free association	3′	5
6. Suggestibility	15″ each question	4
7. Observation and report	15″ each question	4
8. Analogies	30″ each part	5
19. Response to pictures	2′ each part	6
10. Relational test	1′ each part	5
11. Memory for sentences	15″ each part	5
12. Box test	1′ each part	5
13. Absurdities	1′ each part	4
14. Opposites	15″ each part	5
15. Digits backward	Immediate	5
16. Letter line	2′	2
17. Code	1′ each part	8
18. Ball and field	2′	2
19. Geometrical construction	2′ each trial	4
20. Memory for designs	3′	4
Total		100

These twenty tests will now be considered in order.

Comparison of terms (test 6 originally) is valuable though difficult to score. It is retained for further improvement. The average score for parts is 1.42, 1.40, 1.24.

Definitions (test 8 originally) also is difficult to score and possibly should be combined later with Test 1 since the same intellectual processes are involved. The average score for parts is 1.40, 1.19, 1.25, .93. This indicates that *b* and *c* should be interchanged if order of increasing difficulty is desired, so that the order would read "house, honesty, door, conceit."

Digits forward (test 3 originally) is a useful type of memory test, easily administered, and as easily graded. The average score for parts is 1.0, .83, .62, .31, .18. It is recommended that one trial only be given.

Comprehension of questions (test 7 originally) offers opportunity for improvement. The average score for parts is .73, .85, .83, .55, .75. It is suggested that the number of questions be reduced to four, that question *b* be placed first, question *c* second, and that "Why is wastefulness wrong?" and "Why should a person accused of a crime be treated as if innocent until proved guilty?" be used as the third and fourth questions. The credit for excellent answers should be two points each and for relatively unsatisfactory, though partially correct answers, one point each.

Free association (not in original series) is offered as a supplementary test. It is suggested that it be used as in the Pre-adolescent Scale, page 42, with the following rules for crediting response: 50 to 65 words, 1 point; 66 to 80 words, 2 points; 81 to 95 words, 3 points; 96 to 110 words, 4 points; 111 to 125 words, 5 points.

Suggestibility (originally test 4) gives promise of useful development. The picture should be black and white since the colors are difficult to reproduce, fade, soil, and also are differently perceived in accordance with nature of color vision. Substitute for the colored picture thus far used has not been selected. The original questions demand revision as follows: 2 should read: "Was there a little boy with the woman?"; 7, "Was there a basket on the woman's arm?"; 8, "Was the basket empty?"; 13, "Was the knife in the butcher's hand a large one?"; 14, "Did you notice the cat?"

The frequency of resistance by 226 subjects to the several questions follows: Question No. 2—200; No. 4—179; No. 10—152; No. 12—177; No. 14—217; No. 16—159; No. 18—181; No. 20—152.

It is recommended that the credit be reduced from a maximum of 5 to 4 points, and that 4 points be given for resistance of all suggestions as indicated by correct statement or "I don't know;" that 3 points be given for resistance of 9 of the 10 suggestions; 2 points for the resistance of 8; one point for the resistance of 7.

Observation and report (not originally used) is suggested as a means of further utilizing the materials and results of the suggestibility test. The ten questions with odd numbers 1 to 19 may be scored in accordance with correctness of response and the results credited as follows Maximum credit, 4 points, given if all the questions are correctly answered; credit of 3 points if nine answers are correct; 2 points if eight are correct; 1 point if seven are correct.

Analogies (test 10 originally) should be shortened by the omission of part *d*, thus reducing maximum credit to 5 points. The average score by parts is .72, .93, .70, .48, .42, .48. This indicates, as order of increasing difficulty, (omitting part *d*), *b*, *a*, *c*, *f*, *e*. This order is recommended.

Response to pictures (test 1 originally) is retained with the suggestion that part *c* be omitted and that credit be given as follows: for enumeration of parts, nothing; for description involving 5 to 10 correct items, 1 point; for excellent description involving more than 10 correct items, 2 points; for correct interpretation, 1 point; maximum score for each part, 3 points; for the test, 6 points.

The examiner should present the picture to the subject with the request "*Please describe this picture as well as you can and tell me what it means.*"

Relational test (originally 12) is retained because of obviously valuable results, ease and accuracy of crediting. It is suggested that the credit for part *d* be increased from 1 to 2 points, thus making the maximum score for the test 5 points. This change is indicated by the average score for parts, namely, 1.82, 1.66, 1.33, .33.

Memory for sentences is seemingly satisfactorily arranged, the average score by parts being .98, .92, .66, .31, .14. One minor change is suggested, the substitution in part *d* of "softened" for "melted."

Box test (test 13 originally) makes such a good showing that the addition of a part and increase of score from 4 to 5 points are recommended. The average scores for parts are .80, .71, .52, .48. It is recommended that there be added

as part *e* "a large box containing five smaller boxes with five inside of each."

Absurdities (test 9 originally) may well be reduced to four parts by the omission of part *e*, with reduction of score to 4 points and rearrangement of parts to read *c*, *d*, *b*, *a* in accordance with the average scores for parts which are .69, .72, .84, .76, .84.

Opposites (test 11 originally) contains a few unsatisfactory words for which substitutes are suggested. The revised list arranged roughly in order of increasing difficulty of response is upper, cheap, after, top, easy, silent, rough, vacant, wise, many, joy, prompt, distant, beautiful, generous, idle, polite, never, similar, lazy.

It is recommended that the maximum score be increased from 4 to 5 points with credit as follows: 5 points for correct response to each of the 20 words; 4 points for 17–19 correct; 3 points for 14–16 correct; 2 points for 11–13 correct; 1 point for 8–10 correct.

Digits backward (not in original series) promises to be a useful supplement to the scale. It is recommended that five parts be used as indicated below and that 1 point credit be given for each part. The directions for test 3, digits forward, apply also to this test.

(*a*) 8–7
(*b*) 2–7–6
(*c*) 8–3–1–6
(*d*) 9–4–1–3–8
(*e*) 4–7–5–8–6–3

Letter line (test 15 originally). This test has thus far been little used and is in relatively unsatisfactory status. Its retention is suggested with the reduction of score from 4 to 2 points, credits to be assigned as follows: for correct order or for reversal of Y and V, 2 points; for reversal of any two of the pairs VY, LY, HN, HV, 1 point; for anything poorer, no credit.

Code (test 16 originally). It is suggested that the maximum credit be increased to 8 points in accordance with the following rule applicable to each part of test: all

correct, 4 points; one error, 3 points; two or three errors, 2 points; four or five errors, 1 point. The subject should not be permitted to draw the code figure from memory.

Ball and field (test 17 originally). Results do not indicate satisfactory distribution of scores for this test and it is therefore recommended that the credit be reduced from 4 to 2 points and assigned as follows: for spiral path, radii, concentric circles, or any other highly efficient logical plan, 2 points; for less efficient plan, 1 point; for random search, no credit.

Geometric construction (test 18 originally). As originally graded the test is too difficult. The following changes are suggested: for correct response in first trial, 4 points; correct in second trial, 3 points; correct in first trial except for misplacement of triangles, 2 points; correct in second trial except for misplacement of triangles, 1 point; no credit for anything poorer.

Memory for designs (test 20 originally) retained without suggestions for change.

CHAPTER 6

THE INFANT POINT SCALE

At the request of Dr. Yerkes, Dr. J. N. Curtis undertook the accumulation of data for the formulation of a point scale which could be used with children under seven years of age and which would thus supplement the Pre-adolescent Point Scale. The work was begun in January, 1917, and was discontinued in May, 1919, when Dr. Curtis left Boston. For various reasons the material thus gathered was at that time worked over only hastily, and it is published here for the first time.

The majority of subjects used were children of the kindergartens and the first three grades of the public schools of Cambridge, Massachusetts.[1] Some little additional work was done on children in day nurseries, in settlement houses, and in a large children's hospital. Most of the records of the hospital cases are incomplete since the children were surgical cases and were on this account unable to perform certain of the tests. Complete records were obtained upon the following group:

Age, Yr.	Number of Cases
3.0 to 3.4	7
3.5 to 3.9	15
4.0 to 4.4	44
4.5 to 4.9	83
5.0 to 5.4	71
5.5 to 5.9	79
6.0 to 6.4	81
6.5 to 6.9	92
7.0 to 7.4	98
7.5 to 7.9	80

In cases where it was perfectly clear to the examiner that the child had a language handicap so great as to preclude

[1] Throughout the work, Mr. M. E. Fitzgerald, Superintendent of Schools in Cambridge, was most kind and in every way of the greatest assistance.

the possibility of his understanding even simple questions, the record was discarded. There seemed to be no reason for excluding the records of negroes, since the colored children found in Massachusetts are easily the equals of many of the Portuguese and other races included in our group. Record was kept, so far as possible, of the "social status" of the family, either from the opinion of the teacher or judged from the father's occupation. Such classification is, of course, very rough since, as one teacher pointed out, a family which was "average" or even "superior" for her group of children would be considered distinctly inferior in a school situated in the University district of Cambridge. That the children examined came from families of many conditions is shown by the statement of the Superintendent of Schools about the schools used: "School A, mostly Polish families with some Greeks; School B, medium circumstances, quite a colored element; School C, medium circumstances; Schools D and E, fortunate parents; School F, very fortunate parents; School G, Lithuanian, Italian, Greeks; School H, large percentage of Italians; School I, large percentage of Portuguese; Schools J and K, parents in comfortable circumstances."

The experimenters were experienced examiners and included, besides Dr. Curtis, Misses Frances Bean, Katherine T. Gere, Josephine R. Glascock, Doris Holmes, Mary E. Hoover, Elizabeth Lord, and Doris E. Perry, all psychological internes at the Psychopathic Hospital, Boston.

The examination was purposely made too long so that in the end the tests which proved to be poorest could be discarded. The tests which have been selected from the group as most significant and which are therefore recommended as making up a preliminary Infant Point Scale are twenty-two in number and are given below. In order to facilitate the shifting from this scale to the pre-adolescent scale, and from the pre-adolescent to the infant scale, some of the tests of the more advanced scale have been embodied in the infant scale, and many others have been given simpler parts. By such an arrangement, if we

start a child on the infant scale and find him passing all the parts of several tests, his successes may be simply transferred to the pre-adolescent scale and we may continue on that scale without loss of time. In addition to the tests taken over from the pre-adolescent scale, there have been included numerous tests from the Stanford revision of the Binet (with or without modification), six of the Porteus labyrinths, a card of pictures published by C. H. Stoelting as No. 77534–B, and a modification of the Knox cube test.

DIRECTIONS FOR GIVING AND SCORING THE INFANT POINT SCALE

Test 1. (*a*) "*What is your name?*" If the subject does not reply, ask "Is your name John? (or Mary, or any other common name)." If only the first name is given, ask "Henry what?" If no reply, ask "Is it Henry Smith? (or any other common name)."

(*b*) "*How old are you?*"

(*c*) "*Are you a little boy or a little girl?*"

Give 1 point credit for each part answered correctly. Highest possible score is 3.

Test 2. Pre-adolescent aesthetic comparison cards. "*Which is the prettier* (or prettiest) *of these two faces?*" If no reply, ask "Which one do you like the better (or best)?" Show both arrangements of the faces, as in the pre-adolescent scale.

Give 1 point credit for one pair of correct judgments, and 2 points for two or three pairs of correct judgments. Highest possible score is 2.

Test 3.—"*Is this morning or afternoon?*" (or if the test is given in the afternoon, ask "*Is this afternoon or morning?*")

Give 1 point credit for the correct reply.

Test 4. Points to nose, mouth, elbow, wrist. "*Show me your nose*" or "Put your finger on your nose." If no reply, point to the child's eye and ask "Is this your nose? Then where is your nose?" With the older children, if elbow and wrist are located correctly, the easier parts of the test need not be given.

Give 1 point credit for each part given correctly. Highest possible score is 4.

Test 5. Response to pictures. Use the pictures from the Stanford revision of the Binet. Show the Dutch Home. "*Look at this picture and tell me about it.*" If the subject replies, go on to the River Scene. If no reply, say "Show me the little girl. Now tell me some more about it." Whether the child replies then or not, do not count the answer if this assistance has been given, but go on to the other two pictures. The plan is to record the replies of the subject for two pictures where no help has been given. The Post Office is given only when the subject has failed on the Dutch Home.

For each of two pictures reported without prompting, give 1 point for good enumeration or very poor description, and 2 points for good description and interpretation. "Dutch" and "Indian" alone do not count as interpretation. Highest possible score is 4.

Test 6. Repetition of sentences.

(*a*) "Papa."
"Come in."

(*b*) "It is cold and snowing."
"Place the book on the chair."

(*c*) "His name is Jack. Oh, what a naughty boy."
"The path of the moon lies across the sky."

(*d*) "We are having a fine time. We found a mouse in the trap." "Let's all go for a walk to-day. Please give me that big hat to wear."

Say "*Papa.*" If this is failed say "*Come in.*" If both are failed, do not go on. If either is given correctly, go on to part (*b*). Here, also give a second trial if the first is failed. Continue with the test until both trials of some part are failed.

Give 1 point credit for each part passed. Highest possible score is 4.

Test 7. Discrimination of Forms.—Use the material from the Stanford revision of the Binet. Place the circle of the duplicate set at X and say "*Show me one like this,*" at

the same time passing the finger around the circumference of the circle. If no reply, say "Do you see all these things?" (running the finger over the various forms) "and do you see this one?" (pointing again to the circle) "now find me another one just like this one." If the subject replies, go on to the square, triangle, and others; if no reply to the circle, point it out to the child and then go on to the others.

For 1 to 5 successes, give 1 point credit: 6 to 8 successes, 2 points; and 9 or 10 successes, 3 points. Highest possible score is 3.

Test 8. Porteus mazes (numbers as printed by Stoelting, 78703, 78704, 78705, 78706, 78707, and 78708). Start by showing the 3-year test, and while speaking trace around the figure with the eraser end of a pencil. Say "*Take this pencil and draw a line around here, between these two lines. Be sure you keep between these lines.*" Use the same instructions for the 4 and 5-year tests. For the 6-year test, "*Now in this one, if you start here, you can get out either here or here* (pointing), *and you can't get out at the other places because they are closed. What I want you to do is to take the pencil, start here* (pointing), *and draw a line that will come out here* (pointing to the first opening). *Be sure to stay between the lines.*" For the 7-year test, "*Now do the same thing here. Start here, and go this way* (indicating direction) *and come out at the very first opening.*" (Do *not* in this test indicate the proper opening.) If the child starts in the wrong direction, correct him. For the 8-year test say "*Now start here and find the way out without going up any passages that are closed.*" If the child fails the first three tests entirely, the last three need not be given. Do not repeat any test, but unless there is a hopeless failure, go on to the next harder one.

Allow three crossings and returns in each of the first three labyrinths. Give credit for the most difficult maze passed whether or not easier ones are failed. Thus, if the first three are passed, the fourth failed, the fifth passed, and the sixth failed, the subject receives a credit of 5,

since the fifth is the most difficult maze which he passed Highest possible score is 6.

Test 9. Comparison of Lines.—Use pre-adolescent scale material. "*Which is the longer* (or longest) *of these two lines?*" Present the card both sides up.

Give 1 point credit if both trials are passed correctly. Highest possible score is 1.

Test 10. Repetition of Digits.

(*a*)	7–2	8–3	2–9
(*b*)	6–4–1	7–5–2	9–3–8
(*c*)	5–8–6–3	6–9–7–4	7–2–8–5
(*d*)	9–5–2–8–1	1–6–3–9–2	8–4–7–9–1
(*e*)	5–7–2–6–1–4	6–8–3–7–2–5	4–6–9–5–3–2

"*Listen. Say* 7–2." If this part is passed, go on to part (*b*) . If the first trial on (2) is failed, give the second, and, if necessary, the third trial. Continue the test until all three trials for some one part have been failed.

Give 1 point credit for each part in which the child passes one of the three trials. Highest possible score is 5.

Test 11. Missing Parts.—Use the pre-adolescent scale material. "*What is missing from this picture of a lady?*" If no reply, ask "Has she a head? Well, what *is* gone?" If no reply, ask "Has she any arms?" If this is answered correctly, record that help was given, and give no credit for the part. Whether this is passed or failed, go on to the faces and ask for each "*What is missing from this face?*" If the child answers "Body," say "Yes, and what is gone from just the face?" Do not help in these latter parts of the test.

Give 1 point for each part passed. Highest possible score is 4.

Test 12. Comparison of Weights.—Use the 3 and 15 gm. weights from the set used in the pre-adolescent scale. Place the blocks before the child and say "*Which is the heavier* (or heaviest) *of these two blocks?*" Present with the heavier at the right, then at the left. If the child merely points, say "Lift them up and tell me which is the heavier."

Give 1 point credit if the correct reply is given in both trials. Highest possible score is 1.

Test 13. Definitions.

I. (*a*) *"What is a spoon?"*
(*b*) *"What is a chair?"*
(*c*) *"What is a hat?"*
(*d*) *"What is bread?"*

II. (*a*) *"What do we write with?"*
(*b*) *"What do we wear on our feet?"*
(*c*) *"Where do we sleep at night?"*

III. Names: key, penny, watch, closed knife, table, floor, pencil.

If excellent answers are given in Part I, the other parts need not be given.

In Part I, give 1 point for each definition in terms of use, material, description, or enumeration of parts; give 2 points for definitions in terms of "what," "thing," "something," "that" or a real classification or "superior to use" reply. In Part II, give 1 point for each correct answer. In part III, give 1 point if at least six of the objects are named. Highest possible score is 12.

Test 14. Repeats digits backwards.

(*a*)	8–5	7–4	1–6
(*b*)	3–2–9	2–6–5	8–3–7
(*c*)	4–7–1–8	3–9–2–7	2–8–5–9
(*d*)	6–3–7–4–2	9–2–6–5–1	7–4–8–5–3

"I am going to say some numbers to you and I want you to say them backwards to me. Now say this backwards, 8–5." If this is passed, go on to part (*b*) but if it is failed give one or, if necessary, both of the other trials for (*a*). Continue the test until all three trials of some part have been failed.

Give 1 point credit for each part in which one of the trials is reversed correctly. Highest possible score is 4.

Test 15. Memory for Pictures.—Use Stoelting card No. 77534. *"I am going to show you a card with lots of pictures on it. Look at it carefully for after you have seen it for a very short time* (30 sec.) *I am going to take it away and then I want you to tell me what you saw."*

For 1 to 3 pictures recalled, give 1 point credit; for 4 to 6, 2 points; and for 7 or more, 3 points. Be very lenient. Count as correct for the cat, "bear" "dog" or almost any other animal; for the plant, "tree," etc. Highest possible score is 3.

Test 16. Analogies.

(*a*) In the night it is dark; in the day it is

(*b*) In summer it is warm; in winter it is

(*c*) An apple is red; a banana is

(*d*) Hands have fingers; feet have

(*e*) A dog barks; a cat

(*f*) Fishes swim; birds

(*g*) Bread is to eat; water is to

(*h*) A chair is made of wood; a stove is made of

(*i*) If you put fire under wood it burns; if you put fire under ice, it

(*j*) A paper costs a penny; a car-ride costs

Give 1 point credit for each part passed. In part (*i*) count either "melts" or "goes out" as correct. Highest possible score is 10.

Test 17. Cube imitation.

(*a*) 1–2–3–4

(*b*) 1–2–3–4–3

(*c*) 1–2–3–4–2

(*d*) 1–4–3–2

(*e*) 1–3–2–4

(*f*) 1–4–2–3

Use the set of five weights from the pre-adolescent scale material. Arrange the four heaviest blocks in a row between the child and yourself. Take the lightest block and tap the first one in the row (the one at your right). Give the block to the child and say "*Now you do just what I did.*" With some inattentive children it may be necessary to say "Look" or "Watch me" at the beginning. If the subject fails to respond, repeat and urge him to tap the block. Whether this part is passed or not, give no credit, but go on with part (*a*) saying "Now do this" (tapping the four blocks in the order indicated above). If the subject

fails in all of the first three parts, the last three need not be given. Do not give the subject any hint that you are thinking of the blocks by numbers.

Give 1 point credit for each part performed correctly. Highest possible score is 6.

Test 18. Comprehension of questions.

(*a*) "What must you do when you are sleepy?"

(*b*) "What must you do when you are cold?"

(*c*) "What must you do when you are hungry?"

(*d*) "What's the thing to do if it is raining when you start to school?"

(*e*) "What's the thing to do if you find your house is on fire?"

(*f*) "If you were going somewhere and you missed your train, what should you do?"

(*g*) "What's the thing to do if you have broken something that belongs to someone else?"

(*h*) "If someone has been unkind to you and says he is sorry, what should you do?"

If the first three parts are not understood, the form of question may be changed to "Well, what *do* you do when you are —?"

Give 1 point credit to each of (*a*), (*b*), (*c*), and (*d*) which is answered reasonably well (don't be too strict); give 2 points credit for each excellent answer to (*e*), (*f*), (*g*), and (*h*); and 1 point for answers to these last four parts which show some comprehension of the situation. Highest possible score is 12.

Test 19. Color patterns.

(*a*) R–R–R–R

(*b*) G–Y–G–Y

(*c*) R–Y–P–R–Y–P

(*d*) B–Y–B–R–B–Y–B–R

The materials for this test are colored kindergarten sticks (such as those furnished by the Milton Bradley Co.) using ten each of red, yellow, green, blue, and purple. Place the pile of mixed sticks before the child. "*Watch what I am doing.*" Place four red sticks close beside each

other. *"Now you make me some more like that."* If the child continues to place red sticks along side until he has placed five or six, pass on to the next part. If he fails to understand, correct his error, and say "Now I have placed all these that look alike side by side, now you keep doing that." If there is success after help, do not give credit, but pass on to part (*b*); if the child fails in (*a*) even after assistance has been given, the other parts of the test need not be given. In giving parts (*b*), (*c*), (*d*), be sure to form the pattern twice as is indicated above.

Give 1 point for each part arranged with not more than one error or inversion. Highest possible score is 4.

Test 20. Commands.

(*a*) Stand up, move block, clap hands.

(*b*) Give pencil, place one block on the other.

Place a block at one end of the table within reach of the child when he stands up, but not so near that he can reach it more easily when he is sitting. *"Now I want you to do three things for me: first, stand up, then move this block over here* (pointing to a place which the subject can reach without walking around), *then clap your hands* (gesture). *First stand up, then move this block over here, then clap your hands. All right. Go ahead."* If this first command is obeyed exactly do not go on. If there is any mistake, record the part as failed, and say "Now I want you to do some more things for me. First give me the pencil, and then put this block on top of this one (gesture). Do you understand? First give me the pencil, and then put this block on top of this one." Have the blocks and pencil placed beside each other, so that there is no suggestion from their positions as to which should be touched first.

Give 2 points credit if (*a*) is passed; give 1 point credit if (*a*) is failed, but (*b*) is passed. Highest possible score is 2.

Test 21. Copying Drawings.—Use the square and the diamond from the pre-adolescent scale, and draw upon a similar cardboard a circle of the same general dimensions as the square. *"You see that* (pointing to the circle). *I want you to make one just like it. Make it right here."* If

the drawing is very poor, or if the child is obviously dissatisfied with his performance, allow him two more trials. In a like manner, present the square and diamond. If the circle or square is utterly failed, the more difficult forms need not be given.

Give 1 point credit for any poor reproduction, such as an irregular oval for (*a*), a rectangle for (*b*), or a diamond with unequal sides for (*c*). Give 2 points for each figure which is reproduced correctly. Highest possible score is 6.

Test 22. Drawings from Memory.—The figure for this test is an equilateral triangle whose sides are each two inches in length, and whose two legs are each extended two inches above the apex.

Give 1 point credit for any similar figure, such as the same figure inverted, the figure with rounded corners, etc. Give 2 points for an excellent reproduction. Highest possible score is 2.

The highest possible score on the entire examination is 100.

The examination as given above is much shorter than the one which was tried out. Tests were discarded for many different reasons: because they showed little change in score with advancing chronological age; because they gave results which were practically identical with those of other parts of the same test; because they proved too difficult for any except unusually bright children of the higher ages; and so on. It seems hardly worth while here to go into detail as to the reasons for abandoning any test, but we shall list parts which were dropped. They were: In test 4, pointing to hair, neck and eyes; in test 6, sentences intermediate in length between those retained and four very long sentences; in test 12, arranging three weights 3, 9 and 15 in order of weight; in test 13, "What is a horse? a baby? What do we ride on? What do we eat with? What do we read from?" and of a number of presented objects, selecting certain ones asked for; in test 14, series of six digits; in test 16, "a ball is round, a pencil is . . . At school there is a teacher, at church there is a . . .

Dust is dry, mud is . . . Wood floats, iron . . . If you hold a stone up and let go it drops to the ground, if you hold a balloon up and let go . . .; in test 17, sequences 1–3–2–4–3, 1–4–3–2–4, and 1–3–1–2–4; in test 21, a triangle and in test 22, the usual Binet memory drawings.

In the last few months of work, an additional very easy absurdities test was tried out, but since at that time the work was mainly with the younger children, not enough data could be gathered on the older children to justify its inclusion in the scale. The experimenters felt sure, however, that simple absurdities would be satisfactory for use with young children. The ones which were suggested for the infant scale were:

1. My cat has seven feet.
2. Fred ate tin cans for his breakfast.
3. Mary's cat is bigger than an elephant.
4. The dog has bright eyes in his tail.
5. Red ink makes a black mark.
6. Big boys are smaller than small boys.
7. Boys wear ribbons on their hair.
8. The color of my brown horse is gray.
9. John is a tall girl.
10. Pencils would write better if the lead were painted white.
11. The silver in Elsie's ring is a very pretty red.
12. I saw a very heavy horse the other day. He weighed two and a half pounds.
13. My brother's little boy is 65 years old.
14. Tom's school begins at 9 o'clock and ends two hours later at 12 o'clock.
15. Mrs. Smith told Henry to find some warm ice to skate on so he would not be cold.

Records on this test were obtained from 66 children. Of these, ten 3-year olds, sixteen 4-year olds, twenty-eight 5-year olds, and three 6-year olds failed the test entirely. The following children passed some of the parts. One 4-year old child passed part 1, one passed 1, 2, 3, 4 (?), 6, 7, 9, 12, and one passed 3, 6, 7, 8, 9 and 13 (?). One 5-year

old child passed test 1, one passed 1, 4, 6 and 7, one passed 1, 2, 3, 4, 7, 8, 9, 10, and 11, one passed 1, 2, 3, 4, 5, 6, 7, 9, and 10 and one passed 1, 2, 3, 4, 5, 7, 9, and 10. One 6-year old child passed 1, 2, 3, 4, 5, and 7.

We have, then, out of ten 3-year old children, 100 per cent. failing all the absurdities; out of nineteen 4-year olds, sixteen, or 84 per cent. failing them all; out of thirty-three 5-year olds, twenty-eight, or 85 per cent. failing; and of the 6-year olds we have only four cases, so it is obviously unfair to conclude that 75 per cent. would fail ordinarily. Perhaps the test is not suited for even six years, but there surely is an opportunity for an absurdities test less difficult than the ones ordinarily given and applicable to children somewhere between the ages of 5 and 9.

In considering the results from this scale we must remember that there are a number of factors which make for variability in the results of young children. In the first place, at these early ages, home conditions are of much greater importance than they appear to be later, for the children from superior families are in general taught much more at home than the children whose parents have less leisure and less interest in a child's development. In the later years, the less favored children pick up in school many things which the other children have already acquired at home. In the compilation of the scale we have endeavored to minimize certain sources of variability. It is difficult to hold the attention of small children through a long set of directions, and therefore we have used in so far as is possible tests which are direct questions and which require no previous explanation. Very young children are generally much more shy than their older companions, and we therefore allow more trials in any test than we need offer to the older children.

The statistical results obtained upon this preliminary form of an infant scale are not sufficiently numerous to warrant detailed analysis or discussion. The scale seems, however, to be fairly satisfactory for children between the ages of 3 and 6 who can use simple English. The scores

for chronological age 7 and for the few 8-year olds who were examined are little above those for year 6, and the scale is, therefore, not recommended for use above 6 years. The distribution of total scores by half-years in chronological age is given in condensed form in table 26.

TABLE 26.—DISTRIBUTION OF INFANT POINT SCALE SCORES BY CHRONOLOGICAL AGES

Total score	Chronological age									
	3.0–3.4	3.5–3.9	4.0–4.4	4.5–4.9	5.0–5.4	5.5–5.9	6.0–6.4	6.5–6.9	7.0–7.4	7.5–7.9
0–9	2									
10–19	3	5	3	2						
20–29	..	3	4	9	2	1				
30–39	2	2	7	13	4	3	1			
40–49	..	3	15	22	19	6	6	1	1	
50–59	..	2	13	27	21	13	9	4		1
60–69	..		1	8	12	23	23	17	13	13
70–79	..	..	1	2	11	23	26	30	34	19
80–89	..	..	..	..	2	10	16	36	45	34
90–99	..	..	..	..	..	..	..	4	5	13
Number of cases.....	7	15	44	83	71	79	81	92	98	80

Tentative norms suggested for use with the Infant Point Scale are given in table 27.

TABLE 27.—SUGGESTED NORMS FOR THE INFANT POINT SCALE

Age	Score	Age	Score
3.0	17	5.1	57
3.1	19	5.2	58
3.2	22	5.3	59
3.3	24	5.4	61
3.4	26	5.5	63
3.5	29	5.7	65
3.6	31	5.8	67
3.7	33	5.9	68
3.8	35	6.0	70
3.9	37	6.1	71
4.0	38	6.2	72
4.1	40	6.3	73
4.2	42	6.4	74
4.3	44	6.5	75
4.5	46	6.6	76
4.6	48	6.7	77
4.7	50	6.8	78
4.8	52	6.9	79
4.9	53	7.0	80
5.0	55		

RECORD BLANK FOR PRELIMINARY INFANT POINT SCALE (CURTIS)

NAME..... AGE.... DATE OF BIRTH.....
SCHOOL.....
DATE..... NATIONALITY.....
PARENTS SPEAK.....
EXAMINED BY..... SOCIAL STATUS: SUPERIOR, AVERAGE, INFERIOR

1. Give last name.....Age.....Sex.....
2. Æsthetic comparison: a.....b.....c.....
3. Morning or afternoon.....
4. Points to nose mouth elbow wrist.....
5. Response to pictures:.....
   (*a*) Dutch Home.
   (*b*) River Scene.
   (*c*) Post Office.
6. Repeats:.....
   (*a*) Papa.
   (*b*) It is cold and snowing.
   (*c*) His name is Jack. Oh, what a naughty boy.
   (*d*) We are having a fine time. We found a mouse in the trap.

   Alternatives:
   (*a*) Come in.
   (*b*) Place the book on the chair.
   (*c*) The path of the moon lies across the sky.
   (*d*) Let's all go for a walk to-day. Please give me that big hat to wear.
7. Discrimination of forms:.....
   (Reading from left to right, underline forms given correctly.)

   1 2 3 4 5 6 7 8 9 10

8. Porteus labyrinths:.....
   a b c d e f
9. Compares lines twice.....
10. Repeats:.....
   (*a*) 7–2 8–3 2–9
   (*b*) 6–4–1 7–5–2 9–3–8
   (*c*) 5–8–6–3 6–9–7–4 7–2–8–5
   (*d*) 9–5–2–8–1 1–6–3–9–2 8–4–7–9–1
   (*e*) 5–7–2–6–1–4 6–8–3–7–2–5 4–6–9–5–3–2
11. Missing parts: arms nose mouth eye.....
12. Compares weights 3 and 15:.....
   (*a*) By lifting of own accord.
   (*b*) By lifting at suggestion.
13. Definitions:.....
   I. (*a*) Spoon.
   (*b*) Chair.
   (*c*) Hat.
   (*d*) Bread.
   II. (*a*) What do we write with?
   (*b*) What do we wear on our feet?
   (*c*) Where do we sleep at night?
   III. Names: key penny watch closed knife table floor pencil.
14. Repeats backwards:.....
   (*a*) 8–5 7–4 1–6
   (*b*) 3–2–9 2–6–5 8–3–7
   (*c*) 4–7–1–8 3–9–2–7 2–8–5–9
   (*d*) 6–3–7–4–2 9–2–6–5–1 7–4–8–5–3
15. Memory for pictures: (Underline those named correctly).....
   1 2 3 4 5 6 7 8 9 10 11 12

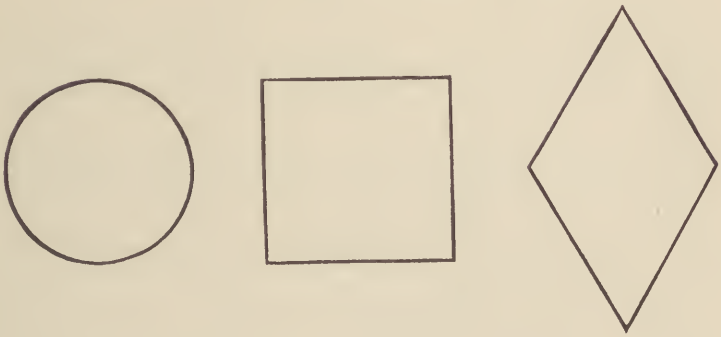
16. Analogies:.....
    (*a*) In the night it is dark; in the day it is
    (*b*) In summer it is warm; in winter it is
    (*c*) An apple is red; a banana is
    (*d*) Hands have fingers; feet have
    (*e*) A dog barks; a cat
    (*f*) Fishes swim; birds
    (*g*) Bread is to eat; water is to
    (*h*) A chair is made of wood; a stove is made of
    (*i*) If you put fire under wood it burns; if you put fire under ice it
    (*j*) A paper costs a penny; a car-ride costs

17. Imitation:
    (*a*) 1–2–3–4
    (*b*) 1–2–3–4–3
    (*c*) 1–2–3–4–2
    (*d*) 1–4–3–2
    (*e*) 1–3–2–4
    (*f*) 1–4–2–3

18. Comprehends:.....
    (*a*) Sleepy.
    (*b*) Cold.
    (*c*) Hungry.
    (*d*) Start to school.
    (*e*) House on fire.
    (*f*) Missed train.
    (*g*) Broken something.
    (*h*) Some one unkind.

19. Color Patterns.....
    (*a*) R–R–R–R
    (*b*) G–Y–G–Y
    (*c*) R–Y–P–R–Y–P
    (*d*) B–Y–B–R–B–Y–B–R

20. Commands:.....
    (*a*) Stand up, move block, clap hands.
    (*b*) Give pencil, place one block on the other.
21. Copies figures:.....



22. Draw from memory:.....

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THE BINET VERSUS THE POINT SCALE METHOD OF MEASURING INTELLIGENCE[1]

Ladies and Gentlemen: I have several important reasons for wishing to discuss this particular methodological aspect of psychology at this time and in this institution. Human engineering on the basis of mental measurement is progressing so rapidly that we have cause to doubt the adequacy of our methods. We face the fact of the almost universal application of such methods of measuring intelligence as the Binet and Point Scales, yet these measuring instruments are extremely crude and at the same time obviously improvable. It is equally our duty and our opportunity so to modify or replace them that our results shall steadily increase in accuracy and reliability. As it happens the three men who have done most to adapt the Binet scale to American needs and to improve it—Kuhlmann, Goddard, and Terman—as students in this institution have enjoyed the privilege of working under the guidance of the foremost of genetic psychologists.

The profound significance of natural science for civilization is no longer seriously questioned. The world war has convinced us, on the one hand, that the physical sciences are far in advance of the biological and social sciences, and on the other hand, that there is imperative need of systematic attention to the latter group of sciences. Many of us are wholly convinced that the future of mankind depends in no small measure upon the development of the various biological and social sciences. Among these physiology, psychology, and sociology are preëminently important. We

[1] Read by invitation of President G. Stanley Hall before his Psychological Seminary, March 19, 1917, by Robert M. Yerkes. Reprinted by permission from *The Journal of Applied Psychology*, 1917, 1, 111–122.

Being Psychopathic Hospital Contributions Whole Number 171 (1917.5). The previous contribution was by Rose S. Hardwick (1917.4), entitled "The Weighting of Point Scale Tests." To be published in *Journal of Educational Psychology*, 1917, 8, 416.

must, I submit, if we are adequately to meet after-war demands and improve the opportunities which will then be offered us, strive unceasingly for the improvement of our methods of mental measurement, for there is no longer ground for doubt concerning the practical as well as the theoretical importance of studies of human behavior. We must learn to measure skilfully every form and aspect of behavior which has psychological and sociological significance. Such are a few of my reasons for wishing to compare critically the two most prominent methods of measuring intelligence.

These methods are too well known to demand historical introduction. Although each is at present widely used, they differ radically in principle and might reasonably be expected to yield strikingly different results. Measurements of intellectual forms and aspects of behavior are of two principal sorts: (1) the scale or group-test procedure, and (2) the single or specific functional measurement. Both the Binet and the Point Scale are groups of tests. It is essential for us, at the beginning of this discussion, to note that for scientific purposes the ideal method of measuring behavior is the specific functional test. Scales are technological tools which have been devised to satisfy certain practical demands. The inevitable direction of development in our mental measuring is toward the graded, standardized, highly accurate, specific test or method. Groups of tests or, as it is convenient to call them, scales, are likely to persist and multiply because they will continue in increasing measure to meet important human needs.

But even now we may appropriately ask, should both the Binet and the Point Scale methods be further developed and improved, should the one or the other be wholly abandoned, should both be given up and in their place a new type of scale embodying perhaps the best principles of each be created, or, as yet another possibility, should the grouping of tests be abandoned and recourse be had to highly developed single functional tests?

At the risk of seeming to reverse logical procedure, I wish at once to suggest my tentative answer to these questions, for after all, this discussion may be endured only for the sake of the conclusions. I believe, in the first place, that scales or groups of tests cannot well be dispensed with. I further believe that we should concentrate our efforts on the development of reliable methods of measuring the various types and aspects of practically significant human behavior. In order to fulfill the conditions which these two conclusions impose upon us, I wish to suggest the desirability and the feasibility of developing a scale for the measurement of intelligence which shall at once combine the safe and serviceable principles of the Binet and Point Systems and improve upon them. This new scale should take account alike of the qualitative and quantitative aspects of behavior. It should consist of carefully selected and graded tests. It should be standardized in such wise that its constituent parts might be used independently, thus serving the purpose of specific functional tests. It should be possible to embody in a single scale all the advantages of existing methods of measuring intelligence, and even to add to them.

There are those who insist that the Binet and Point Scales are not essentially different. It has even been said, carelessly, that the latter is merely a revision of the former method. Such statements are surprising indeed in view of the facts to which I must now call your attention.

Careful analysis of the two scales indicate that they differ more or less radically on three fundamentally important points: (1) the method of selecting or choosing their constituent parts (tests of intelligence); (2) the method of standardizing their tests or combinations of tests; and (3) the method of measuring and expressing the subject's response.

METHOD OF SELECTING TESTS

The various tests or methods which make up the Binet scale are selected in accordance with the number of suc-

cesses or failures at various ages. If a particular test is passed by a certain percentage of individuals at eight years of age, by a lower percentage at seven years, and a higher percentage at nine years, it is, other things being equal, deemed suitable for the eight-year group. It thus appears that tests are chosen in the light of success or failure and arranged in age groups. This method apparently rests upon the assumption that important forms of behavior appear at various times during infancy, childhood, and adolescence. By contrast, the methods which constitute the Point Scale are chosen from the standpoint of functions to be measured, and without regard to their particular relations to the stages of human development. It is assumed in the construction of the Point Scale that all of the important types of intellectual function are present in early childhood and develop more or less rapidly. If this be true, tests or measures for all fundamental forms of intellectual behavior should be available no matter what the age of the subject. Briefly put, the Binet is an age-scale based upon the assumption of *appearing functions;* the Point Scale is a functional scale, based upon the assumption of *developing functions.*

Genetic psychology justifies the statement that all important types or classes of intelligent behavior are represented in the human action system by the end of the third year of postnatal life. Thereafter new acts belonging to the same types continue to appear for some years and all tend to become complexly related to one another and to innate reactive tendencies.

As one result of the heterogeneity of tests within the Binet scale groups, the measurements made on individuals of different ages are not strictly comparable, for the obvious reason that different forms or aspects of behavior have been measured in the two cases. In support of this statement, I need only contrast the tests which make up the five-year and eight-year Stanford-Binet groups. In the five-year, there appear (1) comparison of weights; (2) naming of colors; (3) aesthetic comparison; (4) definition

by use, or better; (5) patience, or divided rectangle; (6) three commissions. The eight-year group consists of (1) the ball and field test; (2) counting backward, 20–0; (3) comprehension of questions; (4) giving similarities of two things; (5) definition superior to use; (6) vocabulary. Even the most enthusiastic believer in the Binet scale and method cannot hope to maintain the thesis that at each or even at any two ages precisely the same forms or aspects of human behavior are measured. In the Point Scale, it is the ideal, thus far only partially realized, to measure the same and the most fundamental features of behavior at every age, and thus to obtain strictly comparable results from year to year.

METHOD OF STANDARDIZATION

The Binet Scale is internally standardized; the Point Scale, externally. For the former method, the process of selecting tests according to percentage of passes and of grouping them according to age constitutes standardization. The result of this method of selecting and standardizing tests is an inflexible scale, which, however accurate it may be for the race, social stratum, or sex, for which it was constructed, cannot possibly yield reliable results when applied to widely differing groups of individuals. For this reason an internally standardized method of measuring behavior is defective.

The Point Scale may be described as externally standardized because the selection and arrangement of the tests have nothing to do with the norms which as standards of judgment are used in the evaluation of results. With the application of the Point Scale to increasing numbers of individuals, the norms, whether for age, sex, race, educational or social status, become increasingly numerous and reliable, and the value of the method correspondingly increases. In order to use the Point Scale profitably for a new race, or social group, it is necessary only to make a sufficient number of examinations to yield reliable norms. They

immediately become standards of judgment. The method does not have to be revised. Thus it is evident that where the Binet Scale is inflexible, the Point Scale is flexible and universally applicable.

METHOD OF MEASURING AND EXPRESSING RESPONSE

The third fundamental difference mentioned above appears in the method of measuring and expressing reaction. The Binet Scale supplies judgments of success or failure. These have been described as all-or-none judgments. From the scientific point of view, they are but rough approximations to the desired and desirable measurement, since they are rather the forerunners of quantitative statements than themselves quantitative. In the Point Scale, judgments are of the more-or-less sort. In other words, there is not a judgment of "pass" or "fail," but instead there is awarded a particular amount of credit, which supposedly varies in correspondence with the character or amount of response. The Binet measurement is neither qualitative nor quantitative, but marks the transition. The point-scale measurement is distinctly quantitative. But in so far as the ideal of point-scale construction is achieved, the method takes account of qualitative as well as quantitative differences in response. The importance of this contrast in the methods which we are considering has, I think, been fully appreciated by very few critics. It is, in fact, the difference between a relatively unscientific procedure and one which is striving to fulfill the essential requirements of scientific method.

There is, moreover, a profoundly important corollary. The type of measurement which the Binet Scale yields is amenable to statistical treatment only in a very restricted way. Thus the mean or standard deviation, the probable error of mean or deviation, the co-efficient of correlation with its probable error either cannot be obtained at all for Binet judgments or are of slight value because of the non-quantitative character of the judgments. By contrast, point-scale measurements can be statistically treated in all

the varied and biologically significant ways. In my opinion, it is primarily because of this merit, that the Point Scale has gained so rapidly its wide recognition and use. The advantage which it has, from the statistical standpoint, over the Binet method is tremendous, and only those persons who are unfamiliar with the essentials of scientific method or incapable of appreciating the value of statistical data fail to note and respond to this difference. The Point Scale because of this characteristic is at once a technological tool and an instrument of research. The Binet Scale is technologically useful, but possesses little research value.

WEIGHTING OF TESTS

It has been objected by some critics, that the point-scale system is unsatisfactory because the various tests are weighted in the light of no definite scientific principle. This adverse criticism I accept as valid, but in fairness it must be pointed out that it applies with equal force to every other scale whose several measurements are averaged or in any other way combined. Thus, for example, the Binet Scale gives equal weight to all the tests of a given age group, despite the fact that they may be concerned with utterly different modes or aspects of response whose practical importance in the individual's life must vary extremely at any given time as well as with age and the correlation of which with general intelligence is known to vary greatly. I submit, not in defense of the point-scale procedure but merely in fairness to it, that the Binet Scale is quite as much in need of a sound and systematically applied principle of weighting as is the Point Scale.

But ground for defense is not utterly lacking. The point-scale tests were not weighted in haphazard fashion. Instead, varied experience in actual examining, coefficients of correlation with general intelligence and of one type of measurement with another were considered and the weightings apportioned as carefully as was possible in the absence of any single and obviously satisfactory principle.

The principle which we propose to apply in the further development and perfecting of the point-scale system is that of weighting in correspondence with the correlation of a particular measurement with general intelligence, or rather with the point-scale score.[1] The higher the coefficient of correlation, the greater the credit for a particular test. This principle we are trying out. If it stands our tests, we shall have met our critics squarely, and at the same time shall have gone beyond the Binet Scale in regard to scientific qualifications.

CHRONOLOGICAL VERSUS PHYSIOLOGICAL AGE

Yet another important consideration remains to be mentioned before an attempt is made to sum up the contrasting characteristics of the two methods. The use of chronological age in connection with mental age as a basis for the statement of individual status is scientifically without justification. The rapidity of growth and of the maturing of organic structures and functions varies greatly for races, for individuals for the sexes, for diverse conditions of nutrition and of health. It is consequently unsafe to compare the status or the achievement of two individuals on the basis of their years, months, or days of postnatal existence. That psychologists will ultimately be forced to admit this fact and to abandon or modify their use of chronological age and of mental age in connection with measurements of intelligence is my conviction. Physiological age should be determined and with it the varied results of measurement should be compared or correlated. This means that in case of each examination there should be stated not only the chronological age of the individual but also the physiological age as indicated by carefully chosen measurements of status of the organism and of functional capacity, and finally, the specific results of varied mental measurements in comparison with the expected results or norms for the appropriate physiological age.

[1] Hardwick, R. S.: Weighting of point scale tests. *Jour. of Educational Psych.*, 1917, 8, 416–424.

By way of summary, the significant points of contrast between the Binet and the Point systems are exhibited in parallel columns.

Binet Characteristics	*Point Scale Characteristics*
(1) Multiple-group, age or year scale	Single graded-test scale
(2) Selection by relation of successes to age	Selection by function measured
(3) Varied, unrelated, unguarded tests	Each test so graded as to be available for wide range of ages
(4) Internally standardized and inflexible	Externally standardized and flexible
(5) All-or-none judgments	More-or-less judgments
(6) Qualitative	Quantitative
(7) Measurements only slightly amenable to statistical treatment	Measurements wholly amenable to statistical treatment
(8) Tests weighted equally	Tests weighted unequally
(9) Implicit assumption, that of appearing functions	Implicit assumption, that of developing functions
(10) Measurements for different ages relatively incomparable	Measurements for different ages relatively comparable

The foregoing discussion has been based wholly upon the latest and most improved form of the Binet method—the Stanford revision, and upon what the writer knows to be the ideals in point-scale construction rather than the actual achievements as visible to those who know only the original or pre-adolescent Point Scale described in "A Point Scale for Measuring Mental Ability." All earlier forms of the Binet method are neglected because their imperfections are more numerous and more serious than those of the Stanford Scale. It may therefore be assumed that such criticisms as are applicable to the latter apply with at least equal force to the former. On the other hand, it must be emphasized that the claims which I make for the point-scale system are not wholly justified by the present status of the method. I have ventured to draw the contrast sharply because of my belief that they will be justified by the results of work on the method which is now well advanced at the Psychopathic Hospital, Boston.

In one respect the Stanford revision appears to be especially weak. It includes a number of tests (vocabu-

lary, fables, arithmetical reasoning, and definitions, for example), which are highly dependent upon education. Were it not for this fact, which shortly becomes apparent to any experienced psychological examiner who attempts to use the method, Terman's extension of the scale by the addition of tests for adolescents and adults would be a very great advantage.

ANALYSIS OF THE STANFORD-BINET SCALE

In connection with this comparison of the two systems of measurement, I have attempted to analyze the Stanford revision of the Binet Scale from the points of view of functions measured and the distribution of measurements among the various age groups. In all, ninety tests appear in the Stanford scale. Of these, seventy-four make up the twelve age groups, while sixteen stand as alternates. There are fifty-five different tests, that is, tests so obviously different in constitution and mode of response demanded that they may not be grouped as equivalents. These may further be reduced to the following twenty-five functional groups on the basis of similarity of responses measured.

STANFORD-BINET TESTS GROUPED ACCORDING TO SIMILARITY OF RESPONSES MEASURED

1. Recognizing and naming objects: naming objects, stating sex, stating name, naming colors, stating age, naming coins, naming days of week, naming months of year, morning or afternoon, indicating right and left.
2. Response to pictures.
3. Memory for: syllables, sentences, digits forward and backward, designs, ideas.
4. Discrimination and comparison of lines, weights, forms.
5. Counting objects and fingers.
6. Counting backwards.
7. Copying geometrical forms.
8. Comprehension of questions.
9. Aesthetic judgment.
10. Defining terms.
11. Patience and form board.
12. Executing commands.

13. Discovery of missing parts.
14. Tying bow-knot.
15. Giving differences or similarities.
16. Ball and field.
17. Vocabulary.
18. Dictation.
19. Mathematical reasoning: making change, value of stamps, box problem, ingenuity test.
20. Sentence construction: three words in sentence, dissected sentences.
21. Visual imagination: clock test, Binet paper cutting, rhymes, absurdities.
22. Fables.
23. Induction test.
24. Code.
25. Free association.

Now it might be supposed, prior to examination, that some sort of test for a particular variety of response would appear in each age group, but this is not the case. Instead, the constructors of the scale seem to have systematically avoided not only repetition of a particular test, but even in the main, its repetition in increasingly difficult form. Thus, for example, the well-known Binet test of response to pictures by enumeration, description, or interpretation appears in the age groups three, seven, and twelve. It does not appear in any of the others nor is there any test which is strictly comparable with it in any one of the remaining nine groups of tests. The definition test which, if it has any practical value, might be supposed to be equally serviceable for all ages, is used for the ages five, eight, twelve and sixteen, and for those alone. Why for these particular ages instead of for any other or others between three years and intellectual maturity is difficult to imagine. Or again, the Stanford test, new to the Binet system, of repeating digits backward appears as an alternate for age seven and as a regular test for ages nine, twelve, sixteen and eighteen. Why, the critical psychologist may well ask, is it not equally serviceable for the ages ten and fourteen? And why, if one chooses to carry this sort of question to its logical conclusion, should not the test be used for all ages from the early stages of linguistic development to intellectual maturity?

As we follow through the list of fifty odd tests which make up this measuring scale, we observe that the number of groups in which a particular test appears tends to diminish. The infantile or childhood tests are many of them repeated in two, three, or even as many as five or six age-groups. But the tests of more complicated or more mature types of response tend, as the accompanying table shows, to be used in only a single group. The only striking exception to this rule is the vocabulary test, which finds place under the ages eight, ten, twelve, fourteen, sixteen, and eighteen years.

LIST AND DISTRIBUTION OF STANFORD-BINET TESTS

Name of Test	*Groups in Which Test Appears*
Indicating parts of body,	III, 1.
Naming objects,	III, 2.
Response to pictures,	III, 3; VII, 2; XII, 7.
Stating sex,	III, 4.
Stating name,	III, 5.
Repeating syllables,	III, 6; IV, al.; VI, 6; X, a 12.; XVI, al. 1.
Repeating digits forward,	III, al.; IV, 6; VII, 3; X, al. 1; XIV, al.; XVIII, 3.
Repeating digits backward,	VII, al. 2; IX, 4; XII, 6; XVI, 5; XVIII, 5.
Comparing lines,	IV, 1.
Comparing weights,	V, 1.
Discriminating forms,	IV, 2.
Counting pennies,	IV, 3; VI, 3.
Copying geometrical forms,	IV, 4; VII, 6.
Comprehending questions,	IV, 5; VI, 4; VIII, 3; X, 5; XVI, al. 2.
Naming colors,	V, 2.
Aesthetic judgment,	V, 3.
Defining terms,	V, 4; VIII, 5; XII, 2; XVI, 3.
Patience,	V, 5.
Executing command,	V, 6.
Stating age,	V, al.
Indicating right and left,	VI, 1.
Missing parts,	VI, 2.
Naming coins,	VI, 5; VIII, al. 1.
Morning or afternoon,	VI, al.
Number of fingers,	VII, 1.
Tying bow knot,	VII, 4.
Giving differences,	VII, 5; XIV, 3.
Naming days of week,	VII, al. 1.
Ball and field,	VIII, 1; XII, 3.
Counting backwards,	VIII, 2.
Giving similarities,	VIII, 4; XII, 8.

Vocabulary,	VIII, 6; X, 1; XII, 1; XIV, 1; XVI, 1; XVIII, 1.
Dictation,	VIII, al. 2.
Giving date,	IX, 1.
Arranging weights,	IX, 2.
Making change,	IX, 3.
Three words in sentence,	IX, 5.
Rhymes,	IX, 6.
Months of year,	IX, al. 1.
Value of stamps,	IX, al. 2.
Absurdities,	X, 2.
Memory for designs,	X, 3.
Reading and report,	X, 4.
Free association,	X, 6.
Form board,	X, al. 3.
Dissected sentences,	XII, 4.
Fables,	XII, 5; XVI, 2.
Induction test,	XIV, 2.
President and king (included under giving difference).	
Problems of fact (included under comprehension of questions).	
Mathematical reasoning,	XIV, 5.
Clock test,	XIV, 6.
Box problem,	XVI, 4.
Code test,	XVI, 6.
Binet's paper cutting,	XVIII, 2.
Memory for passage,	XVIII, 4.
Ingenuity test,	XVIII, 6.

This analysis of the Stanford scale serves two purposes —first, it exhibits the haphazardness of distribution of a given test, the lack of any scientific principle, so far as the placing of a test in particular groups is concerned; and second, it indicates the entire absence of the functional principle in the selection of tests for a particular group.

In view of these characteristics of the Stanford scale, it seems pertinent still further to emphasize the idea of gradation within a given test or measure of behavior. Assuming, as genetic studies certainly warrant us in doing, that the fundamental forms of behavior are present by the end of the third year in their initial stages, it seems logical and scientifically necessary to argue that we should devise methods of measuring these forms of behavior as they develop, and that the most natural and most feasible way

to do this is to select a method which can be applied, according to a gradation scheme, to all stages of development. For example, the test of repeating digits may be increased in difficultness without end. It may be applied alike to the child of three and the intellectually mature individual. It may be graded almost perfectly by the addition of single digits. The initial form of the test may require merely the repetition of a digit after the examiner. The most difficult form may, instead, require the repetition of ten digits. Or, the test of response to pictures may be so devised and developed as to be clearly applicable from early childhood to maturity. It needs only a number of carefully selected pictures arranged according to difficultness of description and interpretation. The child of three years may be required merely to indicate certain objects in the pictures, as named by the examiner. The child of four may be required, instead, to name these same objects. Still later, more complete enumeration of the constituents of the pictures may be expected; then description, and interpretation increasingly full and exact with increasing age. Finally, there would be required, as an adequate form of response, correct interpretation and fair to excellent description.

While it may not be assumed that precisely the same forms or aspects of behavior are measured by this test throughout its age range, it is at least evident that more nearly comparable results may be obtained by using the same materials for different ages than by using diverse and heterogeneous materials and procedures.

Neither the Point Scale nor the Binet Scale is perfect or ever will be. But from their ashes may arise a new scale infinitely superior to anything Binet or any of his successors have imagined. I believe that the method of graded tests whose indices of correlation with one another and with varied measures of efficiency in living are definitely known, will steadily gain ground; that the gradation as gradually perfected will lead to increasingly accurate standardization; that there will accumulate reliable and varied norms

for the guidance of the inexperienced examiner; and that shortly our scales for mental measurement will consist of independently graded and standardized tests which can be used either alone for the measurement of particular response or in such groups as need dictates.

The next step forward I imagine as a scale in which vertical instead of horizontal divisions will indicate age lines. It will consist of a score or two of thoroughly proved and approved methods of measurement, each so devised that it may be applied at any stage of development. Were there twelve steps or grades of difficultness in each test, then the examiner would begin with the first grade for the three-year-old; with the fifth grade for the eight-year-old; with the ninth grade for the twelve-year-old. Not the scale, but its constituent part, the test, would be marked for convenience of use by age lines. The lines consequently would be vertical instead of horizontal!

NORMS FOR USE WITH THE POINT SCALE

NORMS FOR USE WITH THE PRE-ADOLESCENT POINT SCALE
(English-speaking homes)

Score	Mental age	Score	Mental age	Score	Mental age
15	4.0	40	7.8	65	11.2
16	4.1	41	8.0	66	11.3
17	4.3	42	8.1	67	11.5
18	4.4	43	8.2	68	11.7
19	4.6	44	8.3	69	11.8
20	4.7	45	8.4	70	12.0
21	4.9	46	8.6	71	12.3
22	5.0	47	8.7	72	12.5
23	5.2	48	8.8	73	12.8
24	5.3	49	8.9	74	13.0
25	5.5	50	9.0	75	13.2
26	5.7	51	9.1	76	13.4
27	5.8	52	9.3	77	13.6
28	6.0	53	9.4	78	13.9
29	6.1	54	9.5	79	14.2
30	6.3	55	9.6	80	14.5
31	6.4	56	9.8	81	14.9
32	6.6	57	9.9	82	15.3
33	6.7	58	10.0	83	15.7
34	6.9	59	10.2	84	16.1
35	7.0	60	10.3	85	16.5
36	7.2	61	10.5	86	17.0
37	7.3	62	10.7	87	17.5
38	7.5	63	10.8	88–100	18.0 or above
39	7.7	64	11.0		

NORMS FOR PRE-ADOLESCENT POINT SCALE
(Non-English speaking homes)

Score	Mental age	Score	Mental age
21	5	56	10
27	6	62	11
31	7	67	12
37	8	71	13
48	9	75	14

CORRECTIONS FOR PRE-ADOLESCENT POINT SCALE SCORES WHEN CERTAIN TESTS ARE OMITTED

When 4 and 6 are omitted (Deafness)		When 14 and 18 are omitted (Education)		When 1, 2, 3(*a*), 7, 11, 12, 16, and 18 are omitted (Total blindness)	
For scores	Add	For scores	Add	For scores	Add
13–25	5	18–51	0	7–13	11
26–60	6	52–58	2	14–15	15
61–78	7	59–62	4	16–21	16
79	8	63–69	6	22–28	17
80–91	9	70–74	8	29–34	18
		75–77	9	35–39	21
		78–90	10	40–42	24
				43–48	27
				49–50	29
				51–52	30
				53	32
				54	33
				55–56	34

CORRECTIONS FOR PRE-ADOLESCENT POINT SCALE SCORES TO BE USED WITH OLDER SUBJECTS

When tests 13, 14, 16 and 18 are omitted
(Advanced chronological age)

For scores	Add	For scores	Add
18–36	0	56–58	12
37–43	1	59–61	13
44–48	3	62–66	15
49–53	5	67–69	17
54–55	9	70–82	18

SUGGESTED NORMS FOR THE INFANT POINT SCALE

Score	Mental age	Score	Mental age	Score	Mental age
17	3.0	45	4.4	67	5.8
19	3.1	46	4.5	68	5.9
22	3.2	48	4.6	70	6.0
24	3.3	50	4.7	71	6.1
26	3.4	52	4.8	72	6.2
29	3.5	53	4.9	73	6.3
31	3.6	55	5.0	74	6.4
33	3.7	57	5.1	75	6.5
35	3.8	58	5.2	76	6.6
37	3.9	59	5.3	77	6.7
38	4.0	61	5.4	78	6.8
40	4.1	63	5.5	79	6.9
42	4.2	64	5.6	80	7.0
44	4.3	65	5.7		

FIGURES 1 TO 23

FIG. 1.—Test 1, trial 1, Aesthetic Judgment.

Fig. 2.—Test 1, trial 2, Aesthetic Judgment.

a

FIG. 3.—Test 2, a. Missing parts.

b

c

d

Fig. 4.—Test 2, b, c, d. Missing Parts.

FIG. 5.—Test 3, a. Comparison of Lines.

FIG. 6.—Test 7, a. Response to Binet Pictures.

Fig. 7.—Test 7, b. Response to Binet Pictures.

Fig. 8.—Test 7, c. Response to Binet Pictures.

FIG. 9.—Test 11, a.

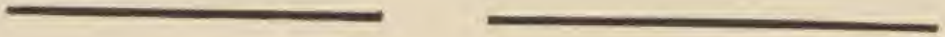


FIG. 10.—Test 11, b.

Fig. 11.—Test 11, c.

Fig. 12.—Test 11, d.

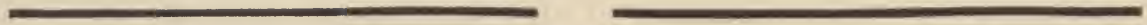


Fig. 13.—Test 11, e.

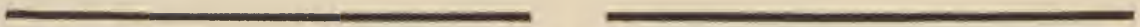


Fig. 14.—Test 11, f.

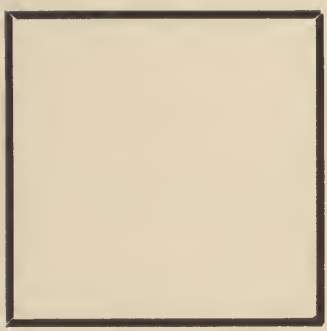


Fig. 15.—Test 12, a. Copy for Square.

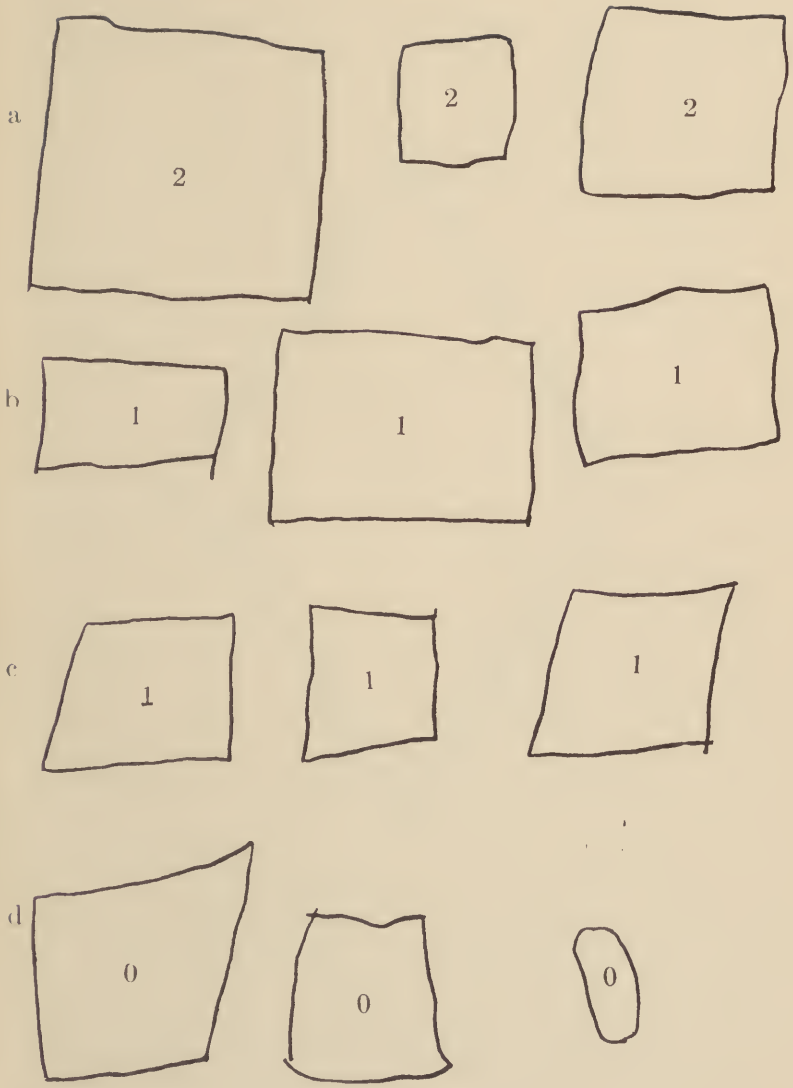


Fig. 16.—Test 12, a. Types of Drawing.

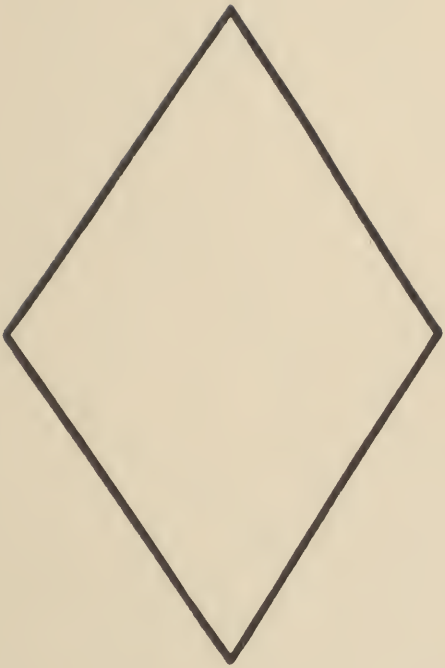


FIG. 17.—Test 12, b. Copy for Diamond.

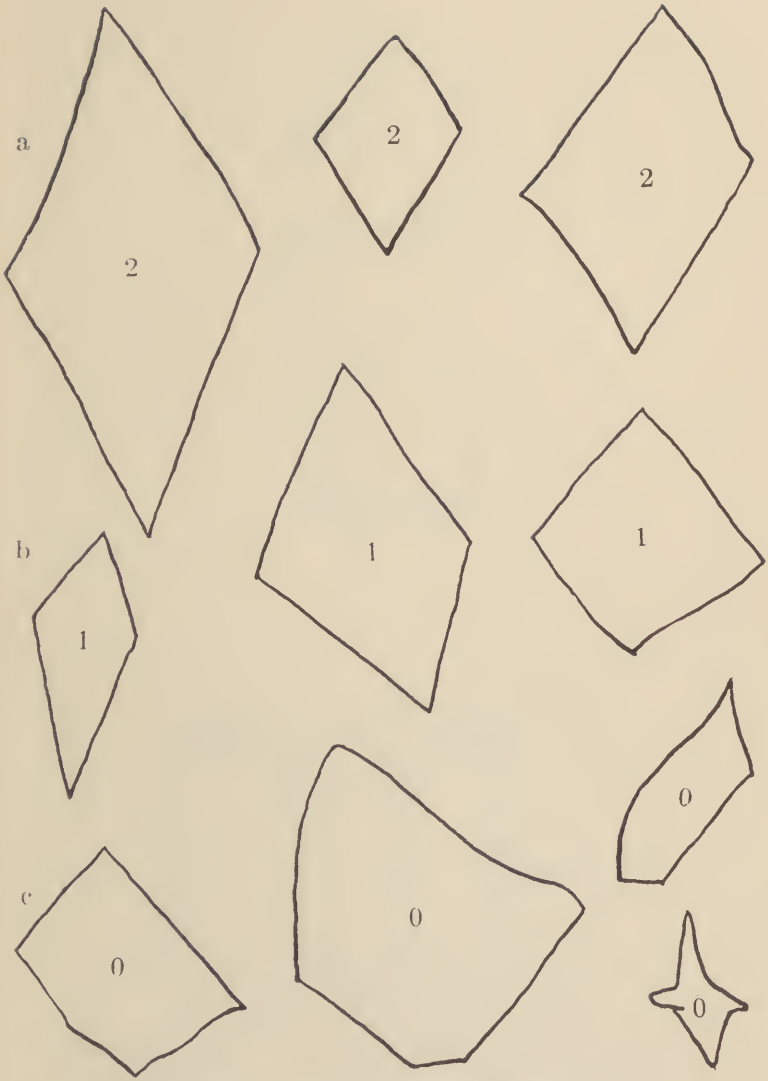
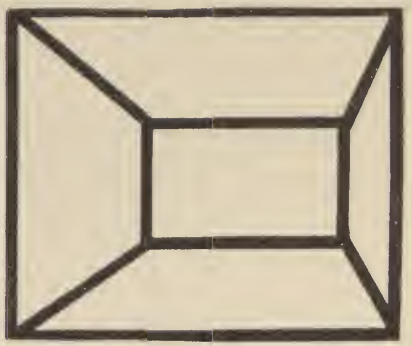


Fig. 18.—Test 12, b. Types of Drawing.



a

b

FIG. 19.—Test 16, a and b. Designs.

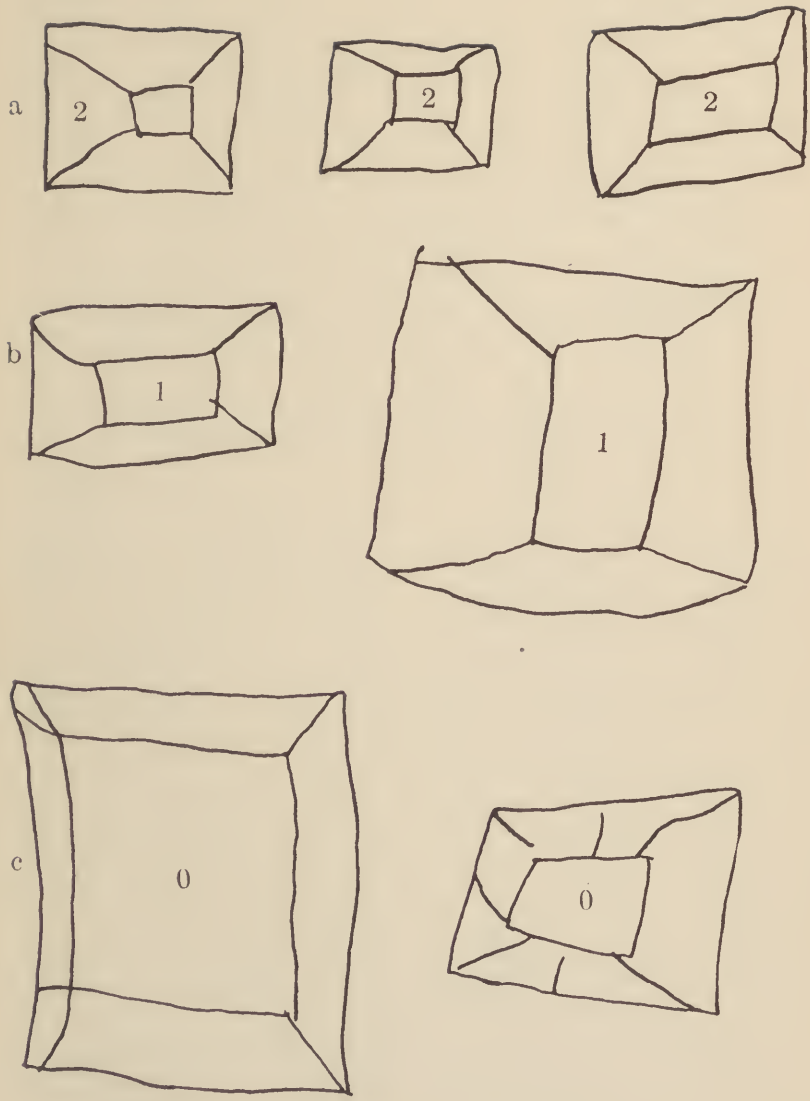


Fig. 20.—Test 16, a. Types of Drawing.

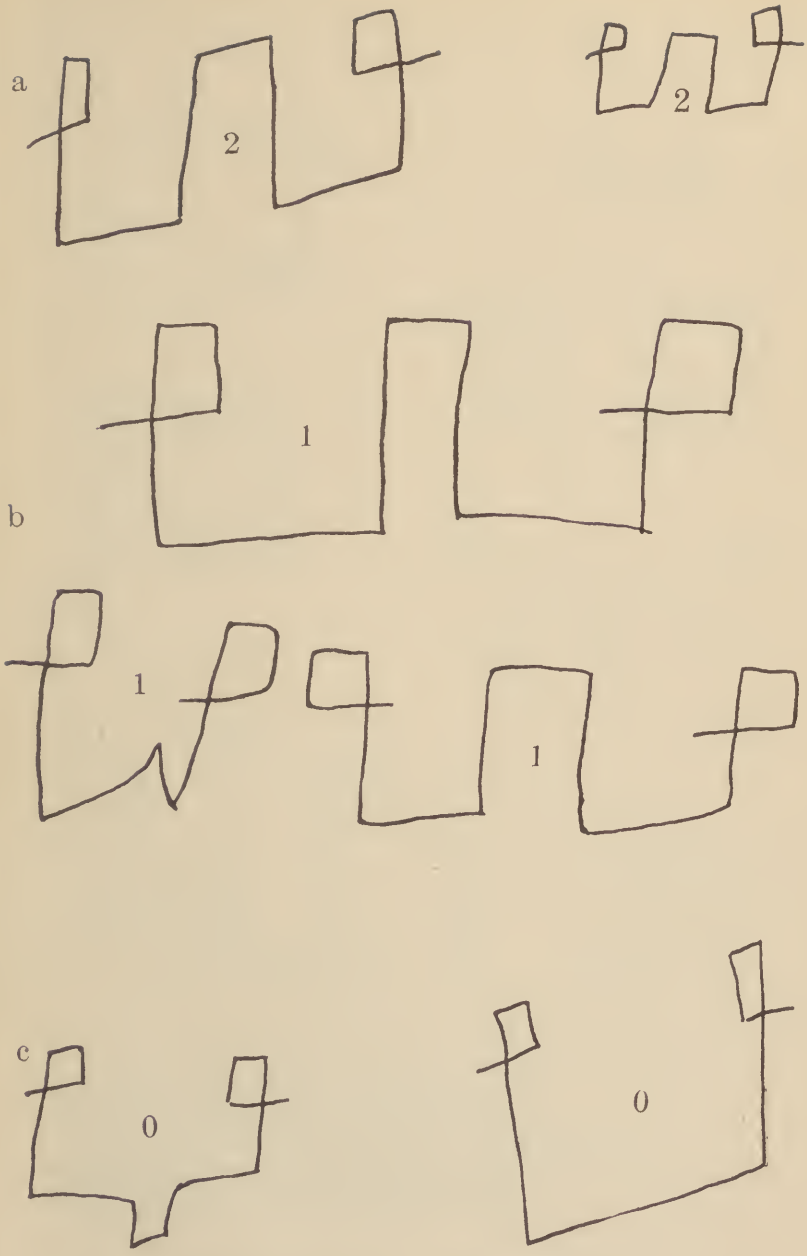


Fig. 21.—Test 16, b. Types of Drawing.

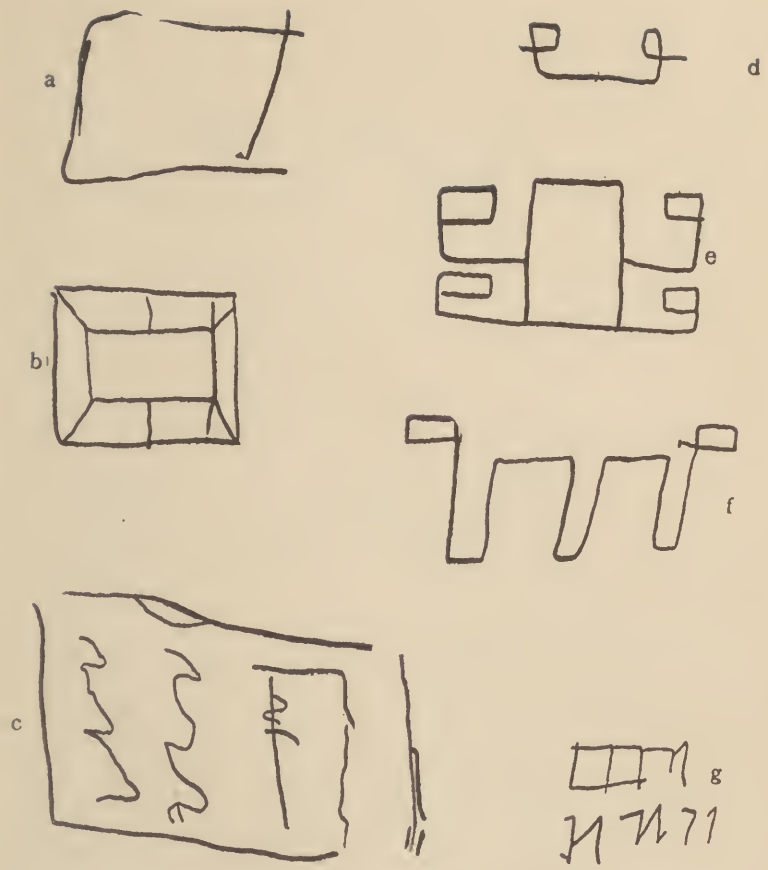


FIG. 22.—Types of Memory Drawing by Insane Patients.

(*a*) Senile dementia, chr. age, 75; mental age, 7.5.
(*b*) Dementia praecox, chr. age, 22; mental age, 11.2.
(*c*) General paresis, chr. age, 50; mental age, 8.9.
(*d*) Manic-depressive (depressed), chr. age, 30; mental age, 18.0.
(*e*) Dementia praecox, chr. age, 18; mental age, 13.5.
(*f*) General paresis, chr. age, 30; mental age, 11.6.
(*g*) General paresis, chr. age, 41; mental age, 8.9.

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Fig. 23.—Test 18, a, b and c. Sentences.

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